The Marine Laboratory
UNIVERSITY OF MIAMI

INTERNATIONAL GAME FISH CONFERENCE

Miami Beach, Florida. November 16, 1957

held under the auspices of the

INTERNATIONAL
OCEANOGRAPHIC
FOUNDATION

and the

GULF & CARIBBEAN FISHERIES INSTITUTE

CORAL GABLES, FLORIDA

INTERNATIONAL GAME FISH CONFERENCE

Miami Beach, Florida. November 16, 1957

held under the auspices of the

INTERNATIONAL
OCEANOGRAPHIC
FOUNDATION

and the

GULF & CARIBBEAN FISHERIES INSTITUTE

MORNING SESSION:
Chairman: Gilbert L. Voss

AFTERNOON SESSION:
Chairman: John S. Gottschalk

SPEARFISHES IN THE WESTERN ATLANTIC

presented by

C. Richard Robins

THE MARINE LABORATORY
University of Miami

at the Second

INTERNATIONAL GAME FISH CONFERENCE

Miami Beach, Florida

November 16, 1957

SPEARFISHES IN THE WESTERN ATLANTIC

by C. Richard Robins
(Read by John E. Randall)

The Marine Laboratory, University of Miami

While we are most concerned in this brief paper with the spearfishes of the genus Tetrapturus, a few words on the history of the entire group may be of interest. A brief account of other Atlantic species also seems necessary.

The giant billfishes and swordfishes have long been known. Pliny writes of the swordfish Xiphias, and allusions to this species were frequent with other classical and medieval writers. As early as 1674 the swordfish was recorded from the Western Atlantic when Josselyn wrote, "We saw a great fish called the Vehualla or sword-fish." The scientific name was proposed by Linnaeus in 1758. Apparently, the first reference to the sailfish is by Piso in 1648 in his Natural History of Brazil. The first species attributed a scientific name was Scomber gladius of Bloch, in 1801. The generic name Istiophorus dates from Lacepede in 1803. Makaira the marlin genus was decribed by Lacepede in 1803 probably based on a blue marlin from the coast of France. Tetrapturus, the genus assigned to the spearfishes was introduced a few years later in 1810 by Rafinesque. The type species is Belone from the waters off Sicily. In the middle portion of the 19th century more individuals of these fishes came to the attention of naturalists and many more names based on incomplete and poor descriptions were introduced into the literature. Again in 1926 a raft of descriptions came from the pens of Jordan and Evermann.

Unfortunately, a major problem, more legal than biological in nature, exists in the untangling of these many early descriptions. Much of the current confusion, regarding the various billfishes is due to the confusion in both scientific and common names. At least this aspect seriously hinders the biological studies for frequently scientists and fishermen from various regions refer to the same species by different names and even worse, call different species by the same name.

The characters that seemed important to early workers have proved too variable or stable to aid in their identification. It is therefore very difficult to tell what species were intended by these writers. Rather than change or add needless new names we choose to describe the variation and biology of the various species and leave the final decision on the names until sufficient material is available.

Thanks to the recent work by scientists, made possible in large measure by the cooperation of anglers, some of the species are becoming well-known. In the marlins, five species have emerged from the tangle. Two, the striped marlin, M. audax, and the black marlin are widespread in the Indo Pacific and lack closely related forms in

The longbill spearfish is a slender species. One just over five feet in total length weighed 12 pounds. Another nearly six feet long weighed only 19 pounds. The bill is long, sailfish-like. The dorsal lobe is not so high as a white marlin and the remainder of the dorsal fin is quite high. The pectoral fin is like that in white marlin. The anal opening is far forward and on this character alone the fish can be distinguished from a marlin or sailfish. Rather than discuss these more fully, I have brought some photographs which I will pass along to be examined. Although this species is probably fairly common on our coast, we have not yet been able to procure a specimen.

The second species is much more robust. A recent specimen from Miami which measures approximately seven feet in total length weighed 38½ pounds and the Puerto Rican fish secured by Robert Maytag about one foot shorter, weighed 32 pounds. Again, the anal opening is far forward but it is not so extreme in this feature as the longbill spearfish. The pectoral fin is large as in the white marlin. One photograph which I have probably is of this species. This fish was not seen by us.

At present, these two species cannot be positively identified with old descriptions from other regions. Those from the Pacific, described as a separate species, have a very short bill -- it scarcely projects beyond the lower jaw. The color print here adequately illustrates the short bill spearfish. The spearfish, Tetrapturus belone of the Mediterranean is also supposed to be a short billed species. The pectoral fin on both of these types is indicated as very small and no mention was made of the position of the anal opening. Mr. Pflueger has noted in past years a few short billed fish in our waters. We have not yet seen such specimens and do not know if they represent extreme individuals or are a third form.

In summary, we may say that two kinds of spearfish must be added to the white marlin, blue marlin and sailfish in the western Atlantic and that neither of them can be confidently identified at present with any described species. Much more information on them is needed and I appeal to all for information. If useful photographs are to be provided they should include in addition to the overall side view of the fish, a close-up of the spread dorsal fin (please do not obscure the lobe of the fin), and one of the ventral surface showing the relative position of the anal opening.

In the remaining time, I should like to call your attention to the photographs and I will be very happy to go over them with any of you.

THE NYLON LONG LINE AS A METHOD FOR GAME FISH RESEARCH BY SMALL CRAFT

presented by

Donald S. Erdman, Fishery Biologist, Federal Aid in Fish Restoration Program (Dingell-Johnson Act), Puerto Rico

and

Robert E. Maytag

at the Second

INTERNATIONAL GAME FISH CONFERENCE

Miami Beach, Florida

November, 1957

THE NYLON LONGLINE AS A METHOD FOR GAME FISH RESEARCH BY SMALL CRAFT

by Donald S. Erdman and Robert E. Maytag

Longlines have been used in the commercial fishery for tunas and billfishes in the Pacific, primarily by the Japanese, for decades (Shapiro, 1948; June, 1940), and the U.S. Fish and Wildlife Service has conducted exploratory fishing with these lines both in the Atlantic and Pacific. Although the vessels which have been used to set these lines are generally large and specially built, Mowbray (1956) has demonstrated that a boat as small as 36 feet with a winch can be employed. He set lines up to 2½ miles in length with 100 hooks off Bermuda with good results.

The senior author had his first opportunity to fish a longline when he assisted Mr. Frank Mather at St. Croix, Virgin Islands, in May, 1957. Fifty hooks were set on a half mile of line about 50 miles off Christiansted. Four yellowfin tunas from 23 to 31 lbs. were caught on this set after a period of about 3 hours. Mather's line was hard-lay nylon, yellow in color, and was subject to kinking and difficult to coil.

Mr. Robert Reuter, a sports fisherman of Mayaguez, Puerto Rico, became interested in longlining. Mr. Reuter made up a line nearly one mile in length of stretched and bonded No. 260 C nylon 5/32" in diameter with 1/8" droppers (hook lines) for 87 hooks.

The junior author, after participating in a game fishing tournament at San Juan, P.R., with his 35 foot vessel BIMINI BABE, expressed a desire to use a longline. Although primarily a sports fisherman, the junior author is interested in the furthering of research on the biology of game fishes and believed that the longline would enhance this, as well as provide for a better means of assessing the potentiality of Puerto Rican waters for fishing for tunas, billfishes, dolphins, etc. in general. Essentially no commercial fishing for the pelagic fishes is being undertaken by Puerto Ricans today. The authors felt that successful longlining for these fishes with a small sports fishing vessel might stimulate commercial interests.

Arrangements were made for the use of Reuter's line on BIMINI BABE. This vessel is a twin screw, broad-beam sports fisher, built by Rybovich. The fighting chair was removed and the longline was coiled on deck; droppers were coiled separately in layers in boxes (the layers separated by sheets of aluminum foil.) A buoy, consisting of an inflated inner tube, was attached to the line every 10 hooks. (As there may be difficulty due to corrosion of the stem of an inner tube placed in sea water, waterproofing of the stem is advised for prolonged use.) A tall bamboo pole with a red flag was attached to the first buoy. Sizes 7/0 to

9/0 hooks were used. Ballyhoo (half-beaks) were used for bait almost exclusively. They were hooked through the eyes so they would have free motion. As indicated by Mowbray (op. cit.), a calm sea spells poor fishing by this method, presumably because baits are not moved about as they would be when a swell is running, due to the action of the buoys. Our worst day's fishing (total catch, one handsaw fish, Alepisaurus sp.; a valuable specimen, this 28 inch fish has been deposited in the museum of The Marine Laboratory of the University of Miami) occurred during the one calm day of fishing.

After two days' fishing, when it was noted that many baits were cut off just behind the head, a series of about 15 double hooks were tried. (One hook was joined to a second through the eye; the first hook was attached through the eyes and the second to the body of the bait fish.) The baits on these hooks were untouched for the remaining six days of fishing.

As there was no winch, the long line was hauled by hand - with gloves. This was facilitated by slowly backing the vessel as the line was brought in over the stern. The line was set in about one hour (best time, 40 minutes) and brought aboard in an average of two hours. The soft-lay nylon was very successful; it was not prone to kink and coiled easily. Three men, including the boat operator, who also assisted in handling the line, were sufficient to set and haul the line, although operations were speeded with a fourth person -- thus enabling two men to be baiting and snapping on the droppers.

An inexpensive improvement which would hasten both the setting and hauling of the line would be a simple wooden drum, such as those on which wire rope is coiled by manufacturers, with a crank added, mounted on the swivelled base for the fighting chair. This would have been done had the fishing operation continued.

Fishing was carried out on eight days in the period from October 29, 1957, to November 13, 1957, from five to twenty miles off San Juan. The depth of fishing was estimated at from 15 to 30 fathoms. The line was usually set by 11 a.m. and was left two to three hours before being hauled in. After setting the line, it was patrolled with the vessel (at which time surface trolling was undertaken; fishes taken by trolling were not included in the longline catch.) The total catch for the eight days is given in Table 1, on following page.

TABLE 1.

Total catch for one set of 2 to 3 hours on 8 days of a longline of 87 hooks

Species	Number of Fish	Weight, in lbs.
Blue marlin	2	101, 120
White marlin	1	44.5
Sailfish	2	36, 48
Wahoo	1	31.5
Dolphin	5	8, 32, 34, 35, 35
Yellowfin tuna	4	4, 5, 8, 130
Barracuda	4	6 - 7
Handsaw fish	1	2
Tiger shark	1	150
White-tip shark	3	100 - 150
Brown shark	1	200

The best day's fishing was October 30, when a 120 lb. blue marlin, a 130 lb. yellowfin tuna, and a 34 lb. dolphin were caught. The next day was also good. A 101 lb. blue marlin, a 48 lb. sailfish, and a 32 lb. dolphin were taken on the longline.

We want to emphasize that the catch as given above does not represent a full day's fishing effort for any one day. A line two times or more in length and a number of hooks could easily be set in one day. With a simple winch considerably more gear could be fished.

About 25% of the baits were lost on average days - frequently with heads remaining on the hooks. Often baits were missing on a series of hooks, suggesting that a school of fish had passed by this region of the line. Examination of the stomach contents of the November 13 catch (2 barracuda, 1 wahoo and 1 white marlin) revealed that a single fish may be responsible for the loss of several baits. The wahoo had 7 of the baits (without heads) in his stomach, one of the barracuda 3, and the second barracuda 1 (all in addition to the bait on the hook which ultimately caught these fishes.)

Several leaders with baits missing were coiled and kinked, and it is believed that billfishes were hooked on these

but managed to free themselves. One sailfish was lost at the side of the boat.

Sharks were not as numerous as expected, and only a few fish were badly damaged on the line (these not included among the fishes listed in Table 1.) Sharks which were caught on the longline usually tangled the line badly. A stout lance with an expanded, knife-like blade, sharp on both edges, was effectively used to kill the sharks that were hooked when they were brought to the boat. The unidentified brown shark regurgitated about a 15 lb. yellowfin tuna which it had taken earlier in the day from a trolling line of BIMINI BABE. (The lure was still in the tuna's mouth.)

The gonadal development of the fishes taken on the longline was noted, and the stomach contents of most of the fishes examined. Those with identifiable food organisms in their stomachs are listed below in Table 2.

Stomach contents of fishes taken by long line off San Juan, Puerto Rico

Species	Stomach Contents
Blue marlin (101, 120 lb.)	4 black-fin tuna (up to 12"), 1 blue runner.
White marlin (44.5 lb.)	2' snake mackerel
Sailfish (36, 48 lb.)	7" flying fish, 2" African pompano, 2 small tunas, small needlefishes.
Yellowfin tuna (130 lb.)	10" oceanic bonito, 1 blow fish (Lagocephalus)
Dolphin (4: 32-35 lb.)	Flying fishes, triggerfishes, needle-fishes, larval stomatopod shrimps.
Barracudas (2: 6-7 lb.)	Small dolphin head, snake eel (Myrichthys oculatus)

Dr. John E. Randall of The Marine Laboratory, University of Miami, assisted the authors during two days of long-lining. He obtained samples of the blood serum from yellowfin tuna for a possible serological study of tunas at the laboratory.

The authors intend to encourage charter boats in Puerto Rico to longline on non-charter days in the hope of obtaining samples of game fishes for a study of their relative abundance throughout the year, their food habits - which may show seasonal change - and the condition of the gonads.

REFERENCES

June, F.C. 1950. Preliminary fisheries survey of the Hawaiian-Line Islands area. Part I - The Hawaiian longline fishery. Commercial Fisheries Review, Vol. 12, pp. 1-23, 18 figs.

Mowbray, L.S. 1956. The modified tuna longline in Bermuda waters. Proc. Gulf and Carib. Fisheries Inst., pp. 137-142.

Shapiro, S. 1948. The Japanese tuna fisheries. U.S. Fish and Wildlife Service, F.L. 297, 60 pp., 22 figs.

GAME FISHING IN THE GULF OF PANAMA

presented by

Edward S. Corlett, III

Vice President, Miami Rod and Reel Club

at the Second

INTERNATIONAL GAME FISH CONFERENCE

Miami Beach, Florida

November 16, 1957

GAME FISHING IN THE GULF OF PANAMA

By Edward S. Corlett, III
Vice President, Miami Rod and Reel Club

Foreword

The purpose of this discussion is simply to point out to potential anglers the shore accommodations, boat accommodations, and the type of fishing that can be expected in the Gulf of Panama.

Shore Accommodations

While Panama City has many hotels, the "El Panama" is the outstanding hotel in the area. The "El Panama" has recently been taken over by the Hilton chain and is a small city unto itself. On shore, practically all of the social activity centers around the "El Panama" Hotel. There are many fine shops and stores in the hotel, together with restaurants, a night club with good entertainment, and legalized gambling.

Boat Accommodations

There are very few actual charter boats in Panama. However, in the past a fishing trip usually could be arranged by contacting El Panama Hotel. There are several privately owned boats that will charter their boat provided they get special permission from the Canal Zone. Most of the private boats are owned by Americans who work in the Canal Zone. During the months they have sailfish tournaments, namely the Panama Rod & Reel Club Tournament, which is held for a period of thirty days during July and August, and the Panama Marlin Tournament, which is held during the month of November, arrangements can be made to charter private boats. The Clubs can be contacted by writing to them direct at Panama City, Republic of Panama. In other months, the hotel should be contacted directly. The charter fees vary, but an average would be approximately $75.00 a day, which includes the boat, captain and one mate. The cost of food is extra and can be figured at about $5.00 per person per day. For the most part, practically all of the boats have diesel engines and, while quite seaworthy, are very slow. The average speed of a fishing boat in Panama would not be in excess of 10 knots. The boats are equipped to stay out for long periods of time, since most fishing trips are for a period of from ten days to two weeks. All of the boats are well refrigerated. There is not sufficient fresh water on the boats to bathe; however, most of the boats are equipped so that an angler can take a salt water bath. Compared to the boats found on the east coast of Florida and the Bahamas area, they are not nearly as luxurious or comfortable. However, when an angler takes into consideration the excellent fishing found in that area, he is usually willing to forego the luxuries and conveniences we have here.

Fishing Area

The area fished is located chiefly in the Gulf of Panama and around what is known as the Perlas Islands and Pinas Bay down to the Columbian border. While casting for reef fish was good in all of the areas, it is probably better in the Perlas Islands, particularly around the Island of Galera. Bill-fishing is largely controlled by the movement of the blue water and is usually found to be most reliable in the waters out of Pinas Bay. The area itself is most pleasant. The Perlas islands, compared to the mainland of Panama, are relatively low and rarely extend more than 150 feet above water level. The mainland itself is bold and rugged with points extending over 6,000 feet above water level. All of the islands are of volcanic origin. The shore itself is a dense jungle which abounds with wild life, namely various members of the cat family, monkeys, parrots, wild boar, deer and several species of birds. There is also fine orchid hunting in the area. There are no cities or areas where an angler can go ashore while fishing in the Gulf of Panama except rural native and Indian villages. In a few areas, it is possible to go ashore and bathe in fresh water streams. For the most part, the water drops off to 50 or 60 fathoms a very little distance away from the mainland. Generally speaking, the waters are calmer than those off the coast of Florida. However, the winds are extremely vexatious and do not seem to follow any set pattern. Normally, there are heavy ground swells; however, they are graduated at a distance where they are not too disturbing to the angler.

Method of Fishing

Most of us who have fished this area have used almost every conceivable method of fishing. We have probably done more casting with artificial lures than any other method. We have all used fly rods, spin rods, plug casting together with artificial lures. In using this tackle, we comply with the specifications set out by the Miami Beach Rod and Reel Club. Briefly, they are a 12 pound monofilament tippet on a fly rod; Spinning is divided into three divisions depending on the breaking strength of the line, i.e., the 4 pound, 8 pound and 12 pound division. In plug casting, we used line not to exceed 15 pound test manufacturer's stated breaking strength. With the exception of a few rod specifications, the general division of the Miami Beach Rod and Reel Club is similar to the I.G.F.A. classes. However, the Miami Beach Rod and Reel Club does have a 9 pound division. In all other respects it is the same as pertains to breaking strength of the line.

Bill fishing is much the same as anywhere else. For sailfish most of us prefer a strip bait. However, quite a few sailfish have been caught on artificial rubber squids. Sailfish in this area seem to rise to the artificial squid just as quickly as any other bait. The trick is in hooking them on the squid. This is accomplished by watching the sailfish very closely and as he turns sideways with the squid in his mouth, setting the hook.

For marlin fishing, we troll New Zealand rigs. Quite a bit of our marlin fishing and reef fishing is done from a drifting boat. In one area in particular, about seven miles northwest of Pinas Bay, there is an underwater reef that rises to within 22 fathoms from the surface. We drift the whole baits over this reef and in this manner, we have three current world record amberjack in the 12, 20 and 30 pound classes I.G.F.A., and several

marlin.

The casting is usually done from skiffs with outboard motors that we carry with us aboard the larger boats.

What Game Fishing Can Be Expected in Panama

I have made five trips to this area for no other reason than to fish. The first trip was made in the company of Luke Gorham and Luis de Hoyos. We planned the trip in such a manner as to spend almost the whole trip (i.e. two weeks) using fly casting, plug casting and spin casting tackle. This was the first such trip that I know of in this area that was devoted primarily to casting. In the past, most of the anglers went down there solely for bill fishing. This trip proved very successful and as a consequence, every March thereafter, several members of the Miami Beach Rod and Reel Club have made trips to the Perlas Island and Pinas Bay area primarily for the purpose of using casting tackle with artificial lures. Several outstanding fish have been taken on casting tackle, including amberjack in excess of 40 pounds, snappers to 44 pounds, African pompano to 22 pounds, large dolphin, including one 23 1/2 pounds on a fly rod with a 12 pound monofilament tippet. A 94 pound grouper and a 47½ pound snapper were taken spin casting in the 12 pound division and several grouper in excess of 40 pounds have been taken in the various casting divisions.

In this area, and particularly in March, which is the dry season, it is no problem to hook big fish. African pompano are exceedingly numerous and Luke Gorham and myself have personally caught in excess of 50 of them in an hour's fishing. We have seen snapper covering acres and acres surfacing on the water. Practically every variety of reef fish is very numerous in this area.

Another fine variety of game fish found in Panama, and particularly during the dry season, is the corbina. This fish is similar to our sea trout or weakfish, with the exception that it is a stronger fighter and averages much heavier than our northern and southern weakfish. When these fish are schooling and striking, four of us have caught in excess of 90 of them in an hour's fishing, most of them ranging between 10 and 22 pounds. While on my first trip to this area, we spent practically the whole time casting, we did devote approximately 3 days to billfishing. In these three days, we boated and released 27 sailfish, 2 striped marlin in the 20 and 30 pound classes respectively weighing up to 174 pounds, and one black marlin in the 130 pound class, weighing 690 pounds.

The subsequent trips were largely a repetition of the first trip. Since members of the Miami Beach Rod and Reel Club have been fishing this area, we have managed to acquire several I.G.F.A. world records. Frank Baxter, of Miami, Florida, has held several light tackle records on Pacific sailfish. Previous to July, 1957, Mr. Baxter had a 145½ pound Pacific sailfish which was recognized as a tie for the I.G.F.A. world record in the 12 pound class. Last July, he bettered his own record in the same class with a 159 pound Pacific sailfish. Members of our club also have the existing world records for amberjack in the 12, 20 and 30 pound I.G.F.A. classes, respectively, and in acquiring these world records, it can be truly

said that the "big ones got away." The largest fish to date has been a 93 pound amberjack, which is the present I.G.F.A. world record in the 30 pound class.

Quite a few sailfish are taken in the Miami Beach Rod and Reel Club's 9 pound class. For the most part, when fishing in the Gulf of Panama, we rarely use monofilament exceeding the 30 pound class I.G.F.A. In that class, at least two black marlin and one so-called silver marlin have been taken. The largest black marlin being 409 pounds. The silver marlin is a potential I.G.F.A. world record which weighed 216½ pounds. The reason for the use of the word "potential" is because of the controversy concerning the proper identification of this fish.

We have all used fly rods in a manner in which I am sure the manufacturer did not intend. Amberjack in excess of 23 pounds have been taken on fly rods, as well as snappers over 10 pounds, dolphin to 23½ pounds, and many other nice fish. We have also had quite a bit of sport catching the yellow fin tuna on casting tackle. These tuna can usually be found by looking for a particular type of porpoise, namely a black, rather small porpoise. When these porpoise are found, the yellow fin tuna are normally in company with them.

There are huge groupers in the area and in one area in particular, at anchorage these fish will swim under the boat in the evening. On just such an occasion, Luke Gorham caught a 177 pound jewfish in the 20 pound class which was, at that time, recognized as the I.G.F.A. world record. Spiketail or broomtail grouper have been taken in excess of 120 pound, with one spiketail grouper weighing 109½ pounds taken on 15 pound test line. Rainbow runners are exceedingly numerous and are taken on all types of casting and trolling tackle up to 18 pounds. During the rainy season, dolphin are so numerous that they become nuisances. The average dolphin is quite a bit larger in the Pacific than the Atlantic, very likely because of the fact that they are not fished nearly as hard as they are here.

We have caught as many as 200 snappers, all good sized, in a day's fishing and included in the catch would be jacks, amberjacks, groupers, African pompano, rainbow runners and several other varieties of fish.

Conclusion

In the opinion of most of us who have fished the area, we believe that the Gulf of Panama is certainly one of the best fishing grounds in the world. At certain times, marlin are quite numerous and they are present in fair numbers year round. We have caught black marlin, Pacific blue marlin, striped marlin, and the marlin that is labelled by the fishermen in Panama as a silver marlin. Sailfish are always numerous. For the casting addicts, I am sure that I am safe in saying that it is virtually impossible to exaggerate the fishing. Practically every reef fish available in Florida is available in Panama in greater numbers and larger sizes, and with several other species that are not found in Florida waters. The fish are uneducated and seem to take

baits readily. One Pacific sailfish was taken on an artificial lure by an angler who was using a plug casting rod. The angler made an orthodox cast and retrieve and during the time he fought the fish, we noted ten other sailfish around the boat.

The Gulf of Panama readily lends itself to all types of fishing. As heretofore pointed out, the area is excellent for all forms of casting, and in my opinion it cannot be excelled for billfishing.

PRELIMINARY ANALYSIS OF THE DISTRIBUTION OF WHITE MARLIN, *MAKAIRA ALBIDA* (POEY), IN THE GULF OF MEXICO

presented by

Robert H. Gibbs, Jr.

WOODS HOLE OCEANOGRAPHIC INSTITUTION
Woods Hole, Massachusetts

at the Second

INTERNATIONAL GAME FISH CONFERENCE

Miami Beach, Florida

November 16, 1957

PRELIMINARY ANALYSIS OF THE DISTRIBUTION OF WHITE MARLIN, MAKAIRA ALBIDA (POEY), IN THE GULF OF MEXICO

Robert H. Gibbs, Jr.

Woods Hole Oceanographic Institution, Woods Hole, Massachusetts

ABSTRACT

Records of white marlin, Makaira albida (Poey) from long-line stations of the Fish and Wildlife Service M/V OREGON indicate a concentration of this species in the Mississippi delta region in midsummer, followed by a gradual dispersal to other parts of the Gulf of Mexico. In April and May the marlin again move northward. The northward distribution and migration appears limited by the 75° surface isotherm. There is no evidence of correlation of either presence or abundance with depth of water. Some distributional similarities between white marlin and yellowfin tuna are noted, and a few pertinent literature references mentioned. The need for further study is emphasized.

INTRODUCTION

The white marlin, Makaira albida, is a valued game fish in the western North Atlantic, yet in spite of the avidity of sport fishermen for catching this fish, little is know if its distribution or habits. It is well known that this species apparently congregates in large numbers in the summer off the middle Atlantic states, and that Ocean City, Maryland, has been the principal area from which anglers sought the marlin in this region. Certain areas of southeast Florida, the Bahamas and Cuba appear to harbor white marlin at certain times, but not in the concentration boasted by Ocean City. The fish is sold on the market in Cuba and other West Indian Islands. In the Gulf of Mexico, almost nothing is known.

Beginning in 1954, the Fish and Wildlife Service vessel OREGON has made a series of cruises, using Japanese long-line gear, to explore the potential production of pelagic fishes, particularly tunas, in the Gulf of Mexico and adjacent waters (Bullis, 1955). Careful records were kept at each station of the entire catch. These records have been kindly made available to me by Harvey R. Bullis. The present analysis is based entirely on the records from the M/V OREGON.

The conclusions or deductions presented here are highly tentative. The study of pelagic fishes is in its infancy; data are difficult to come by and are usually not as complete as would be desired. The major impediment in this study has been the lack of complete coverage, either in time or area. This is inherent when such studies are thrust upon a single organization, in this case the Gulf Fisheries Exploration and Gear Research Section of the U. S. Fish and Wildlife Service. It is hoped that the analysis presented here will stimulate

others to gather similar data in order to fill in gaps and present a more satisfactory picture. Meanwhile, the conclusions which follow may serve as a guide, to stand or fall on the basis of future evidence.

DISTRIBUTION AND MOVEMENTS

The stations at which white marlin were caught by the OREGON are plotted by months in Figure 1. While lack of coverage in vital areas obscures the over-all picture, some conjecture is possible. For all practical purposes, the collections in February and October are too few to contribute anything. Of the others, April and September do not sample the region of the Mississippi Delta (off Louisiana), and July and August do not sample any region except the Delta. In the following discussion, the "Delta region" will refer to the rectangle between about 26°30" N lat. and the northern Gulf Coast, and between 87° and 90° W long.

The weights of the marlin caught were predominantly between 30 and 60 pounds, the range being from 19 to 110 pounds. Using average weights per station, 73 stations fall between 30 and 60 pounds, 2 less than 30, 8 more than 60. The following discussion is therefore based on a rather uniform size group.

Bullis (1955) has noted that yellowfin tuna (Thunnus albacares) are apparently absent from the Delta region in March. This seems to be true also for white marlin, as none of four stations produced these fish in that month, which would be most unusual for any other time. In March, however, marlin have been taken in the southwest Gulf and toward the Delta region. Despite fairly active collecting in May, no white marlin were taken in the Gulf of Campeche, but each of 2 stations in the Delta produced them. June stations, despite inadequate coverage, show a decided grouping of marlin at the Delat, with some still slightly westward from it. In July and August, the concentration in the Delta is extremely heavy. As will be shown later, success is the rule in these 2 months both in number of stations taking marlin and in number of marlin taken per set. Thus the lack of coverage in other regions does not completely offset the fact that the fish do concentrate in the Delta at this time. This compares to the rather similar concentration off Ocean City, Maryland, also in July and August. Beginning in September, the fish again become dispersed more or less throughout the Gulf.

RELATION TO TEMPERATURE

Some of the above observations may be roughly correlated with temperature distribution. Surface temperatures were recorded at almost all stations. Although the long-line gear usually was fished at 10 - 20 fathoms, the temperature at the lower depth is probably little different than that at the surface. Even so, the surface temperature may be construed as an index.

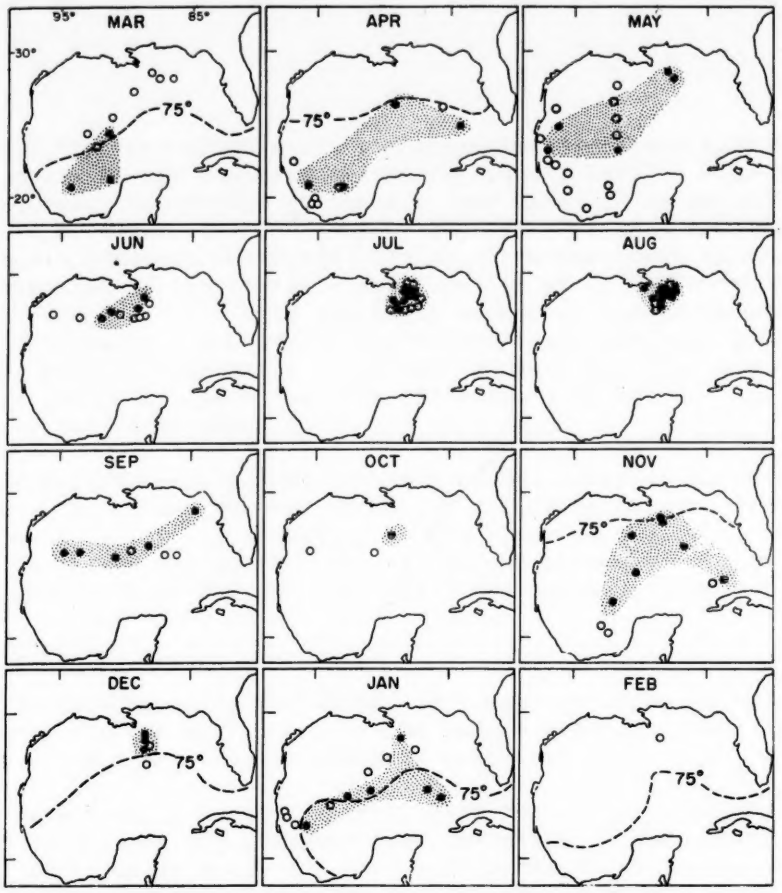


FIGURE 1. Distribution of white marlin in the Gulf of Mexico by months. Black dots = successful stations. Open circles = unsuccessful stations. General range, as indicated by the data, shown by cross-hatched area. 75-degree isotherm from Fuglister, 1947.

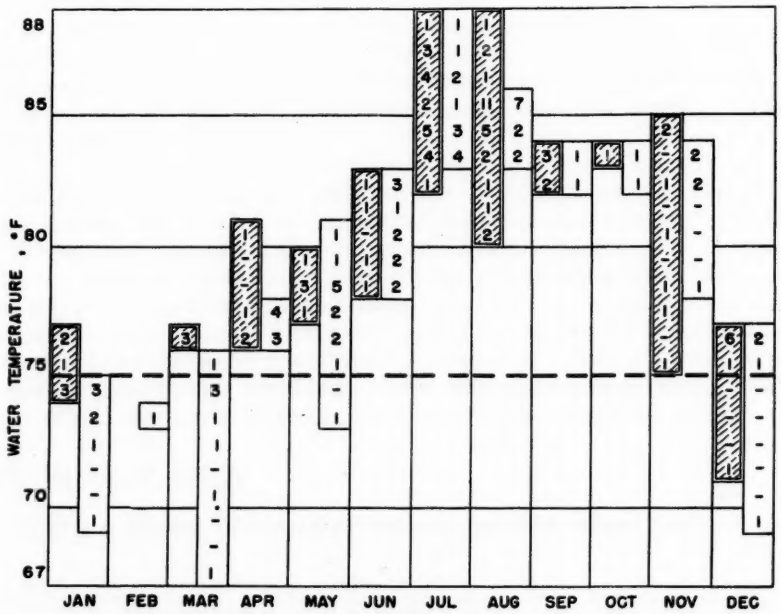


FIGURE 2. Surface temperatures of stations where white marlin were caught (cross-hatched bars) and of unsuccessful stations. Numbers in the bars indicate number of sets at each temperature.

On the maps (Figure 1), the approximate contour line for 75° surface temperature is indicated (from Fuglister, 1947). From May through October, the average is nowhere less than 75° in the Gulf, but beginning in November, the 75° contour gradually recedes southward and in March again advances northward. It is noteworthy that almost none of the successful marlin stations have been in water far north of this average 75° contour. The only seemingly anomalous record is one in January in the Delta. Apparently the Delta region has some sort of attraction, generally speaking. Had this anomaly occurred anywhere else, there would have been need for extensive explanation. In the Delta, it is not surprising.

Figure 2 tends to uphold the presumed correlation with the 75° contour. From June through November, all stations were made in water at least 75° at the surface. In the other months, when stations were made in colder water, the lack of success below 74° or 75° is notable. The catch in December at 71° is the anomaly discussed above.

RELATION TO SEASON

In this section, the catch, as judged by number of stations at which at least one marlin was caught and by average number of marlin caught at each station, is analyzed (Table 1).

From April to August in the Delta region, with one exception, half or more of the stations produced marlin. Because of the paucity of stations in April and May, little can be said of these months except that marlin are present. The poor success in June indicates that the concentration is just beginning. In July and particularly in August, success in both number of stations and average number of fish per station is high. This supports the contention that this is an actual concentration of fish, and is not due merely to the lack of fishing in other areas at the same time. From September through January, the few samples indicate the presence of marlin, but little else. The notable lack of success in February and, especially, March, has already been interpreted as indicating a lack of marlin for a short period, perhaps due to low water temperatures, perhaps to spawning elsewhere.

In areas outside the Delta, few conclusions can be drawn. The average number of fish per successful station is never great. The large number of successful stations in September, all in the northern Gulf, may be sampling fish which are moving away from the Delta, but have not yet dispersed completely. To some extent, success seems dependent upon water temperature, as noted previously. The drop in success in April and May is possibly due to the postulated movement toward the Delta and away from the southwest Gulf, where quite a few stations were fished, but where success was poor.

RELATION TO DEPTH OF WATER

Table 2 shows the number of successful stations and the

numbers of fish caught in relation to water depths. In the Delta, there are no stations over a bottom deeper than 1,700 fathoms. Here, above bottoms from 500 to 1,200 fathoms, successful stations are the majority. The greatest number of fish per set is over 1,000 fathoms of water. This extremely high average is principally due to three sets made at almost the same point (28° 47-50' N, 87° 48-50' W) on three consecutive days in August, on which a total of 32 fish were caught. If these are subtracted from the rest, an average catch of 1.8 results. which is actually slightly less than that for the adjacent months.

In the rest of the Gulf, no pattern is shown. Successful stations are scattered over depths of from 600 to 2,100 fathoms. Average catch is consistently somewhat less than at most stations in the Delta. Noteworthy are the catches over depths of more than 1,800 fathoms.

Since white marlin are probably independent of the bottom, these data are useful mainly in further pointing out the wide distribution of the species in the pelagic habitat. The summer congregation, which is over the continental slope, is believed to be a feeding congregation, not a spawning one. Because of nutrients contributed by the Mississippi affluence, this is undoubtedly an area rich in small fish and squids, on which the marlin can feast.

The data also tend to support the reality of this presumed summer congregation in the absence of stations outside the Delta in that season. The number of successful stations is higher, and the average number of fish per station is also high.

Breaking the depth data into months (Table 3) shows no particular correlation of depth with season in regions outside the Delta, and only during the summer in the Delta area.

COMPARISON WITH YELLOWFIN TUNA

Since the primary purpose of the OREGON's long-lining activities was to catch yellowfin tuna, it is of interest to make some rough comparisons between that species and the white marlin. This information has been gleaned from the unpublished cruise reports distributed from Pascagoula, Mississippi. The writer has not gathered complete data on the distribution of yellowfin, but since the stations are the same ones that are plotted on the maps in Figure 1, some deductions may be made.

Table 4 lists the approximate average number of hooks set out for each fish caught by monthly periods. This, roughly, indicates the abundance of the tuna at these times; the smaller the number of hooks, presumably the more the tuna present. The greatest abundance occurs in July and August, both of which include only the Delta region. In September, there is a slight decline, followed by a strong decline in November. December is anomalously high, but January is again low. No figures are available for February through

April, but Bullis' statement (1955) that yellowfins are apparently absent from the Delta in March is significant.

Thus, to a certain extent, the yellowfin show a distributional similarity to white marlin. The catch is rather uniformly low through most of the year, but indicates that they are scattered throughout much of the Gulf. The March disappearance from the Delta suggests that yellowfind, too, may be following a receding isotherm. And again, like the marlin, they apparently concentrate in the Delta during July and August. This concentration, in contrast to presumptions concerning white marlin, is believed to be a spawning phenomenon (Bullis, in litt.).

PREVIOUS KNOWLEDGE OF GULF WHITE MARLIN

While white marlin have been well-known from the Atlantic and the West Indies, their presence in the Gulf of Mexico west of the Indies has not been widely noticed. Baughman (1941, 1950) reports sight records from Port Isabel and Port Aransas, Texas, but these appear to be the only references for the area.

The large concentration in the Delta region in July and August, and the similar congregation off Ocean City, Maryland, at the same time, have both been tentatively considered post-spawning feeding congregations. Evidence for this has not been published, but this seems to be the case. Little is known of the spawning habits in the Gulf (or anywhere else for that matter). Few notable concentrations other than the midsummer ones have been noted. Erdman (1956) however, records April as the peak month off Puerto Rico and states that enlarged ovaries have been reported during that month. The best-developed ovary that he had seen was from a fish caught on June 9, 1956. In the sporting literature, Hemingway (in Vesey-Fitzgerald and LaMonte, 1949:156) reports the heaviest run of white marlin north of Cuba in the last two weeks in May. Farrington (Ibid. 1:155) notes a "terrific run," the "largest in the Atlantic" in April off Miami Beach, Florida. It is possible that these are spawning runs of some nature, and they do precede the observed summer concentrations. The precise nature of these runs, however, needs to be examined, as does that of the summer aggregations.

LITERATURE CITED

BAUGHMAN, J. L.

1941. Scombriformes, new, rare, or little known in Texas waters with notes on their natural history or distribution. Trans. Tex. Acad. Sci., 24:14-26.

1950. Random notes on Texas fishes, Part II. Tex. J. Sci., 2(2): 242-263.

BULLIS, HARVEY R., JR.

1955. Preliminary report on exploratory long-line fishing for tuna in the Gulf of Mexico and the Caribbean Sea. Part I. Comm. Fish. Rev., 17(10):1-15.

ERDMAN, DONALD S.
1956. Recent fish records from Puerto Rico. Bull. Mar. Sci. Gulf and Caribbean, 6(4):315-340.

FUGLISTER, FREDERICK C.
1947. Average monthly sea surface temperatures of the western North Atlantic Ocean. Pap. Phys. Ocean. Meteor., 10(2):1-25.

VESEY-FITZGERALD, BRIAN AND FRANCESCA LAMONTE
1949. Game fish of the world. N. Y. Harper & Bros., pp. xx 446.

TABLE 1

Successful and unsuccessful white marlin stations by months. S = successful. U = unsuccessful. Avg. fish = average number of marlin taken per successful set.

	NON-DELTA					DELTA				
	S	U	%S	No. Fish	Avg. Fish	S	U	%S	No. Fish	Avg. Fish
Jan.	5	5	50	6	1.2	1	2	33	2	2
Feb.	0	0	--	--	--	0	1	0	--	--
Mar.	3	4	43	7	2.3	0	4	0	--	--
Apr.	3	8	27	4	1.3	1	1	50	2	2
May	3	14	18	4	1.3	2	1	67	2	1
June	2	3	40	3	1.5	2	7	22	2	1
July	0	0	--	--	--	20	12	63	35	1.75
Aug.	0	0	--	--	--	24	11	69	102	4.3
Sept.	5	2	71	8	1.6	0	1	0	--	--
Oct.	0	2	0	--	--	1	0	100	3	3
Nov.	6	5	55	14	2.3	1	0	100	3	3
Dec.	0	1	0	--	--	1	2	33	1	1

TABLE 2

Successful and unsuccessful white marlin stations according to depth of water. See Table 1 for explanations. Asterisks indicate a station for which number of fish was not recorded.

	NON-DELTA					DELTA				
Depth of Water	S	U	% S	No. Fish	Avg. Fish	S	U	% S	No. Fish	Avg. Fish
<100 fm	0	1	0	--	--	0	0	--	--	--
100	0	0	--	--	--	*1	0	100	?	?
200	0	0	--	--	--	0	0	--	--	--
300	0	0	--	--	--	0	1	0	--	--
400	0	1	0	--	--	0	2	0	--	--
500	0	1	0	--	--	3	2	60	10	3.3
600	3	3	50	4	1.3	5	3	63	6	1.2

TABLE 2 (cont'd.)

Depth of Water	NON-DELTA S	U	% S	No. Fish	Avg. Fish	DELTA S	U	% S	No. Fish	Avg. Fish
700	1	2	33	2	2	8	5	62	18	2.25
800	0	2	0	--	--	4	0	100	10	2.25
900	1	1	50	5	5	11	3	79	31	2.8
1000	0	4	0	--	--	8	8	50	41	5.125
1100	2	3	40	3	1.5	4	2	67	9	2.25
1200	3	6	50	7	2.3	2	1	67	8	4
1300	1	3	33	1	1	*3	4	43	5	2.4
1400	0	0	--	--	--	2	4	50	3	1.3
1500	0	2	0	--	--	0	2	0	--	--
1600	1	2	33	1	1	0	2	0	--	--
1700	0	3	0	--	--	0	0	--	--	--
1800	3	2	60	6	2	0	0	--	--	--
1900	3	2	60	5	1.67	0	0	--	--	--
2000	4	3	57	5	1.25	0	0	--	--	--
2100	1	0	100	1	1	0	0	--	--	--
2200	0	1	0	--	--	0	0	--	--	--

TABLE 3

Successful and unsuccessful white marlin stations by months and by depths. Figures without parentheses = number of marlin. Figures in parentheses = average number of marlin per set. The superscript ^{x} indicates that there were unsuccessful stations.

	NON-DELTA Depth Range <600	600-1099	1100-1599	>1600	DELTA Depth Range <600	600-1099	1100-1599	>1600
Jan.	--X	--	1	6(1.5)^{x}	--	--	2(2)^{x}	--
Feb.	--	--	--	--	--	--X	--	--
Mar.	--	--	3(3)	1(1)^{x}	--	--	--X	--
Apr.	--	1(1)^{x}	3(1.5)^{x}	--X	--	--	2(2)	--
May	--X	1(1)^{x}	--X	2(2)^{x}	--	1(1)	1(1)	--
June	--	3(3)^{x}	--	--	--	1(1)^{x}	--X	--
July	--	--	--	--	1(1)^{x}	26(1.6)^{x}	3(2.7)^{x}	--
Aug.	--	--	--	--	14(4.7)^{x}	72(4)^{x}	8(4)	--
Sept.	--	--	3(1.5)^{x}	5(1.7)	--	--	--	--
Oct.	--X	--	--	--	--	--	3(3)	--
Nov.	--	7(3.5)^{x}	2(2)^{x}	4(1.3)	--	3(3)	--X	--
Dec.	--	--	--	--	--	--	1(1)^{x}	--

TABLE 4

Average number of hooks set for each yellowfin tuna caught by month and year.

	1954	1955	1956	Avg.	Total Sets
Jan.	--	75	258.6	166.8	13
Feb.	--	?	--	?	1
Mar.	--	?	?	?	11
Apr.	?	?		?	12
May	126.5	117.2	--	121.9	18
June			--		14
July	19.0	--	35.7	22.4	34
Aug.	56.2	19.8	--	33.0	35
Sept.	46.2	--	--	46.2	8
Oct.		--	--		3
Nov.	143	--	22.1	33.2	12
Dec.	34.4	--			13

FIGURE 1

Distribution of white marlin in the Gulf of Mexico by months. Black dots = successful stations. Open circles = unsuccessful stations. General range, as indicated by the data, shown by cross-hatched area. 75-degree isotherm from Fuglister, 1947.

FIGURE 2

Surface temperatures of stations where white marlin were caught (cross-hatched bars) and of unsuccessful stations. Numbers in the bars indicate number of sets at each temperature.

THE JOHN K. HOWARD BILLFISH PROGRAM

presented by

Raymond B. Manning

THE MARINE LABORATORY
University of Miami

at the Second

INTERNATIONAL GAME FISH CONFERENCE

Miami Beach, Florida

November 16, 1957

THE JOHN K. HOWARD BILLFISH PROGRAM

By Raymond B. Manning

The Marine Laboratory, University of Miami

Many advances in our knowledge of the problems related to game fishes have been made since the first Game Fish Conference last November in Nassau. Today we are going to cover some of these advances, and perhaps point out other problems to be studied in the future.

Perhaps the most widely known of the fishes that come under the collective term "game fish" are the billfishes, the marlin, sailfish and spearfish. Yet, even though these fish are widely sought after for their fighting ability, and, in some parts of the world, their food value, our knowledge of them is, at best, spotty.

As pointed out by Voss in a paper presented at the International Game Fish Conference in 1956, nothing is known about the age, life span, and growth rate, among other things, of our Atlantic marlins.

I am sure that many of you know of Colonel John K. Howard. Many of you know him personally, and others of you have had correspondence with him about marlins or perhaps about some other aspect of his billfish research program.

But many people have asked just what is Colonel Howard doing, and what is his billfish program? I think that here at the Laboratory almost everyone wonders why he needs two secretaries and how there can be so much work on a small program that involves only a few fish. This paper will try to answer these and other questions about the John K. Howard billfish program.

John K. Howard was born in Paris, France, in 1891. He attended Harvard, graduating with a B.S. in 1914 and an LL.D in 1917. During the First World War he served in the American Forces in France, receiving his discharge in 1919.

In that same year he started as a law clerk in a Boston firm, eventually becoming a partner in the firm. His work led him into corporate and estate practice and finally into the problems of trusteeships and directorships. He was the executor of one of the Agassiz trusts. Due to his Harvard degree, his association with the Agassiz trust fund, and his interest in big game hunting, he has kept in close contact with the Museum at Harvard and with museum personnel.

During the Second World War, Colonel Howard again entered the service. As part of the war effort, many scientists were engaged in surveys of the islands in the Pacific. During the early part of the war there was no civilian agency charged with coordinating this research. Colonel Howard was the director and organizer of this basic research in the Pacific Theater. At the end of the war he was placed in charge of the disposal of surplus property in the Pacific. Part of his work involved travelling all over the Pacific area, visiting virtually every country in the Pacific.

Colonel Howard came to Miami around 1950. Having kept up his contacts with museums, especially the Museum of Comparative Zoology, and scientific people, he became interested in the field of Marine Science. Consequently, he went back to school, took a B.S. in Zoology at the University of Miami, and entered Graduate School in Marine Biology. At this time, he became interested in big game fishing and in the billfishes, especially the sailfish.

In 1952-1953, under the auspices of the Marine Laboratory and the Museum of Comparative Zoology, Colonel Howard made a trip to Fiji, New Zealand and Australia. While in Australia he organized an expedition to the Great Barrier Reef. This expedition made one of the most extensive collections of the invertebrates and fish of the Great Barrier Reef ever to be deposited in American museums.

In 1954-55, Colonel Howard again made a prolonged trip, this time seeking more information about the billfishes. On this trip he not only visited Australia but, realizing that the greatest lack of information about marlin distribution was centered in East Africa, he spent about three months fishing and seeking information on the Natal Coast; and another six weeks at Mozambique, before leaving for America via West Africa and the Mediterranean.

In each of the areas he visited during his 1954-55 trip, Australia, Keeling-Cocos Islands, Mauritius, Mozambique, South Africa, Belgian Congo, Gold Coast, Liberia, Sierre Leone, Gambai, French West Africa, and others, he met and talked to sportsmen and scientists, learning all that he could about the billfishes in the waters of each country. He also obtained maps of the countries as well as some idea of the oceanography of that area.

While at Lourenço Marques, in Mozambique, finding that he was in the off season for marlin, he made one of the most extensive collections of molluscs ever to come from that area -- five cases of specimens. These were distributed between the Museum of Comparative Zoology and The Marine Laboratory.

On returning to Miami in 1954, he began to organize the program and to set up his billfish library and the distribution files. At present, the library contains almost all references to the Istiophoridae, including most of the scientific works, as well as many books and articles on sport fishing. The purpose of collecting all of these various books and papers is to have in one library as many as possible of the references to the Istiophoridae.

The distribution files are set up in the following manner. All of our correspondence, except that which is concerned with books and reprint orders, is filed geographically. Each ocean is divided into quadrants, such as Atlantic North East, Pacific South West, and so on. Under these general geographical areas are filed sub-folders for each country. In each country is placed all correspondence relating to istiophorids in that country.

The main files are the Istio-General files -- into these files go the initial correspondence, or any answers that leave some doubt as to what genus of billfish is found in that particular country. There are secondary files titled, marlin-general, sailfish-general, and further geographical files for each species. Each of these general files are, in turn, further sub-divided into countries, and all are cross referenced back to the Istio-General files.

Perhaps an example or two would help to illustrate the filing procedure. An inquiry may be sent to a fisheries officer in the Marianna Islands. Our carbon copy of this inquiry is filed in the Istio-General-Pacific North West-Marianna Islands folder. Then, let us say, that we receive a reply from this fisheries officer, stating that he has caught or seen both sailfish and marlin in the Marianna Islands. His letter and our reply will be filed in Istio-General-Marianna Islands, and Marlin-General-Marianna Islands, a cross-reference to the correspondence in the Istio-General file. Also, all references to billfishes in papers and books are cross-referenced to their particular geographic area in the distribution files. There are also other files in which ecological data and oceanographic data are kept.

Besides the two extended trips made by Colonel Howard in 1952-1953 and 1954-1955, he has made several shorter trips to Jamaica, the Virgin Islands and Panama. At present he is on another extended trip, again visiting Barazuto Bay at Mozambique and Mauritius.

On this trip, Colonel Howard will collect marlin and sailfish at Bazaruto Bay in Mozambique and try to organize other anglers into a group who will collect a number of these fish, which will be stored in a freezer at nearby Beira, Mozambique. Colonel Howard will fish off Mozambique until the middle of November, and then will fly to Mauritius. There he will again try to collect a few of the billfishes and store them in a freezer.

Around the middle of January, Dr. James Morrow plans to meet the Colonel in Mauritius, to examine the marlins caught or collected by the Colonel.

While he is fishing at Bazaruto Bay, Colonel Howard will try to have a group at Durban, Natal, get together and freeze a few marlin and sailfish. If this is successful, Dr. Morrow will examine the fish at Durban and Beira on his way to Mauritius. If enough fish are collected, Dr. Morrow will have a fair sample of the istiophorids of the South West Indian Ocean. The purpose of this trip will be to try to connect or differentiate the marlins and sailfish of the Indian Ocean and the Pacific Ocean.

The sources of information for our billfish files may be divided into two categories, scientific and non-scientific. In the former are the catch statistics of the Japanese longline fisheries, the results of various fisheries surveys made by scientific personnel, and the taxonomic literature dealing with Istiophoridae, as well as correspondence with scientific personnel engaged in studies of the Istiophoridae.

Among the non-scientific sources are the records of many big game fishing clubs, Colonel Howard's personal friends who aid our program, and individuals, mostly fishermen, from all over the world who are interested in giving the information they have. Also in this category are the fishing magazines, daily newspapers, and other books and reprints from which we gather information.

These are just a few of our sources. Colonel Howard on each of his own trips has made many personal contacts, all over the world, and has brought together much invaluable information about these fish.

Our inquiries about the distribution of these fish are based upon several things. First of all, we try to concentrate on areas about which little or nothing is known. These areas may easily be determined by checking our own files and by checking the most recent literature in the field.

As several people have pointed out, there is little known about the occurrence of marlin and sailfish off the West Coast of Africa and the East Coast of South America, not to speak of the Indian Ocean. Consequently, when we come across a note in the Commercial Fisheries Review, for example, stating that a Japanese ship will do preliminary survey work in one of these areas, we immediately attempt to contact the home base of this ship and obtain the catch statistics of the trip upon the return of the vessel. This method has proved to be moderately successful.

A second method of approach is to follow up the recommendations of our correspondents or to ask new contacts to suggest others to whom we might write. This is also a relatively successful method of obtaining information and it has been used by Colonel Howard to cover many areas from which we might otherwise be unable to obtain any information. This method is especially useful for obtaining data that may be pin-pointed as far as geographical area is concerned. Thus, though most of our Japanese longline data covers large ocean areas, our letters seek information about the fishes that are caught close to any island or country.

Although Colonel Howard has many other ways of obtaining information, I think only one more source needs to be mentioned, this being the information we receive from the Japanese, including preliminary longline fishing surveys and the catch records from previously established fishing areas. These records are important, and I think they will prove to be quite valuable when the time comes for all of this data to be analyzed and coordinated.

For example, we now have in our files the monthly catch statistics, translated into English, of Pacific Blue marlin, Black marlin, Striped marlin and sailfish from the Pacific and Indian Oceans from October, 1956, to February, 1957, based on returns to Misaki and two other ports. Also, we have the preliminary reports of the two recent surveys in the Atlantic Ocean, and we shall be receiving these monthly Pacific reports and all Atlantic reports for some time to come. We also have learned through our Japanese contacts that there will soon be an Arabian Sea Survey, as well as another Atlantic Survey early in 1958. We expect to receive full reports of these surveys when they are published.

Although at present confusion exists over the English common names and the scientific names of the marlin, I think that most of us will agree that there is a good degree of stabilization of these names as far as the Japanese common names are concerned. To the Japanese, a white marlin is a fish with a rigid pectoral fin; we usually refer to this fish as a black marlin. The Japanese recognize a marlin, similar in size to the white marlin, which does not have rigid pectoral; they call this fish a black marlin, and we say it is a Pacific form of the Atlantic Blue marlin. The third marlin recognized in the Pacific and Indian Oceans by the Japanese is the striped marlin -- all of us are in accord as far as the common name of this fish is concerned.

Some idea of the distribution of these fish in the Pacific and Indian Oceans may be obtained by consulting the Japanese longline catch records. The records Colonel Howard has obtained show that the main concentration of black or rigid pectoral marlin in the Pacific Ocean from October to February centers around Australia and the Sunda-Timol and Banda-Flores areas. The Pacific Blue marlin is much more common in the Western Indian Ocean and the Central Pacific than is the Black marlin.

Incidentally, the Atlantic Blue marlin and the Pacific Blue marlin are so similar that the Japanese use the name Kurojiki for both of them.

In writing to us in response to inquiries about possible catches or sightings of billfishes in their local waters, many people have asked what information we would like to obtain.

First of all, the kind of fish should be stated, whether marlin or sailfish; and second, the exact locality is very important. Then, if possible, the weight and the length of the fish, and a description of how the length was measured. Also, it would be helpful to add whether or not the pectoral fin was rigid; that is, could it be folded against the body. Finally, if photographs are taken, perhaps several views of the fish could be taken, such as a ventral view, to show the position of the vent, and a lateral view, with the dorsal fin fully spread. To be able to receive this information with each report would be of great help.

These are some of the aspects of the John K. Howard Billfish Program. This program is a long-range one. Results may not be forthcoming for some time, but the material is coming in and is being steadily processed. Perhaps some day Colonel Howard will be able to publish it. When this does happen, our knowledge of these fish, their distribution and their taxonomic status, should be greatly advanced.

MARLIN FISHING IN PUERTO RICAN WATERS

Presented by

Donald S. Erdman

Fishery Biologist
Federal Aid in Fish Restoration Program
(Dingell-Johnson Act), Puerto Rico

at the Second

INTERNATIONAL GAME FISH CONFERENCE

Miami Beach, Florida

November 16, 1957

MARLIN FISHING IN PUERTO RICAN WATERS

by Donald S. Erdman

INTRODUCTION

In 1949, the Government of Puerto Rico through its Office of Tourism sponsored a preliminary sport fishery survey of the salt waters of Puerto Rico to determine primarily the presence of billfishes. Though commercial fishermen and an occasional sport fisherman or two had caught a few billfishes in previous years, the extent of the fishery was unknown.

During the first half of 1949, Mr. Ralph S. McCallan conducted a survey with an eye for possible sport fishery development. Though he did not actually have luck in boating a billfish, he did hook a sailfish 500 yards northeast of Las Cucharas, Fajardo on February 26, and raised another sailfish near the same place on the following day.

In 1950, Mr. Roy Bosche, well known marlin fisherman and boat captain, came to Puerto Rico to fish for marlins and to teach sport fishermen in Puerto Rico how to fish for marlins. Mr. Bosche converted a number of Puerto Ricans into successful marlin fishing enthusiasts almost overnight. On August 20, 1950, a first blue marlin of 404 pounds was caught by rod and reel off San Juan. From January 4 to March 1, 1951, Mr. Bosche fished off La Parguera where he caught one blue marlin and two sailfish and raised several other billfishes.

In 1951, Mr. Art Wills of Miami brought down his three sport fishing launches, which have been operating ever since from the tourist dock at San Juan. In succeeding years, the launches of Mr. Wills and members of the San Juan Yacht Club ("Club Nautico") with their private boats have accounted for most of the billfishes caught from Puerto Rican waters.

In September, 1954, the writer began his work on sport fishery investigations under the auspices of the Fishery and Wildlife Section of the Department of Agriculture and Commerce of Puerto Rico. This work is supported by Federal funds through the Dingell-Johnson Act. Among other projects, the author has attempted to study the marlin fishery in all its phases in Puerto Rico from the beginning to the present.

Seasonal Distribution:

Records of billfishes caught from Puerto Rican waters have been collected from the files of the newspaper "El Mundo", records of Club Nautico, frequent interviews with local sport fishermen and boat captains, and from personal observations. Mr. Juan Casellas, sport fisherman of Arecibo, has been helpful with the collection of marlin gonads. Charter boat captains at San Juan and La Parguera have been most cooperative in providing fishing information.

These accumulated records show a marked seasonal distribution of relative abundance of the three billfishes commonly caught around Puerto Rico. The blue marlin is the most abundant of the billfishes, with the sailfish second, and the white marlin third. A spearfish, 33 pounds, was caught by Mr. Robert Maytag on October 2, 1957; one or two others have been caught before according to Mr. Art Wills. Two swordfish were reported seen off San Juan, mentioned in "El Mundo" on March 7, 1952 by Mr. Bill Stewart a charter boat captain at the time; two young swordfish have been found by the author, one in a dolphin stomach and another in a blue marlin stomach (Erdman:1956). Swordfish, however, are apparently rare in Puerto Rican waters.

Figure 1 indicates the seasonal distribution of billfishes in Puerto Rican waters. The number of fishes are listed for each month of the year, and the records are as complete as possible.

Blue marlin are most abundant in the catch and are more often either raised or lost. They have been caught every month in the year. They are apparently most abundant in October.

White marlin have been caught every month in the year. They are most abundant in April. There are only two records for September for the period of seven years 1950 to 1957.

Sailfishes are most abundant in November and occur throughout the winter and spring. No sailfishes are recorded for June and only one record for July.

Weights:

The largest sailfish on record from Puerto Rico is 68½ pounds caught in October, 1953; the smallest on record is 10 pounds caught in November, 1951. The most commonly caught size is between 40 and 45 pounds. Recorded weights of sailfishes are considerably fewer than the total records since weights are not infrequently omitted.

The largest white marlin on record from Puerto Rico is 90 3/4 pounds caught in April, 1955; the smallest on record is 22 pounds caught in January, 1955. The average white marlin weights run from 50 to 60 pounds in Puerto Rico.

The largest blue marlin, 756 pounds, was caught off San Juan in April, 1956, and it constitutes the present world rod and reel record for the Atlantic blue marlin. The smallest blue marlin on record from Puerto Rico weighed 46 pounds and was caught off San Juan in December, 1956. Over one third of the blue marlins on record from Puerto Rico weigh from 100 to 150 pounds. (Figure 2)

Migrational activity:

There are no clear cut answers to the migrations of billfishes in Puerto Rican waters, but there are some indications.

Tables 1a, 1b, and 1c show catch records by weights, by month, by year, and by coasts for the blue marlins.

Large blue marlins are more frequent from April through September. In September, 1956, 23 blue marlins had an average weight of 194 pounds whereas in October, 1956 the average weight of 22 blue marlins was only 146½ pounds. The largest and smallest weights for both months were about equal, but the average difference of nearly 50 pounds is perhaps an indication that the September run of blue marlins are different fishes from the October run.

The good run of blue marlins off San Juan in July and especially August, 1957, occurred perhaps at the expense of the usually good catch of blue marlins in September. Only 4 blue marlins were boated off San Juan in September, 1957, whereas 12 were boated in August. In 1956 off San Juan, one blue marlin was boated in August, and 18 in September.

Fishing effort for blue marlins has been considerably less off Mayaguez on the west coast and off La Parguera on the south coast. The data are really insufficient to show any distinct migrational pattern. The greater catch of blue marlins off La Parguera during March and April has been more or less consistent over the years; and they are apparently the best months for marlin activity off the south coast. With the exception of October, 1955, marlin fishing has not been generally good off La Parguera at that time of year.

Blue marlin fishing off Mayaguez on the west coast has been best during the month of September. Contrary to the north coast, the west coast has better blue marlin fishing in September than in October.

Feeding habits:

The author has examined the stomachs of over 60 blue marlins at different times of the year to determine the feeding habits. Few marlin stomachs are full, many are empty or nearly empty, and a few stomachs are everted through the mouth after the fish has fought long on a hook. Frigate mackerels, Auxis thazard, from 6 to 10 inches in length, have been found more often than other fishes in the stomachs of these blue marlin. Mackerel and tuna have formed the greatest bulk, if not actually the greatest number, of the stomach contents. When blue marlin have been feeding on frigate mackerels, the fishing has been unusually good on at least two occasions: (1) at Mayaguez from September 1, 2, and 3, 1955, 8 boats caught 7 blue marlins; and (2) at La Parguera, on October 16, 1955, 4 boats caught 5 blue marlins.

One of the blue marlins caught on October 16, 1955, at La Parguera was a male weighing 105 pounds with its upper bill broken off and completely healed over. The upper bill was actually shorter than the tip of the lower jaw. In spite of this handicap,

this fish had a stomach full of 6 frigate mackerels, more food than found in any one of the 4 other marlins caught the same day. From this evidence, it would not appear that the bill is indispensible for purposes of feeding.

Stomachs of 4 white marlins and 6 sailfishes have been examined. Their feeding habits are similar to blue marlins with some interesting differences. Both balyhoo and flying fish have been found to date only in the sailfish. Table 4 provides a comparison of the stomach contents of blue marlin, white marlin and sailfish.

Baits:

The most popular and successful bait for marlin in Puerto Rico are mullets Mugil curema about one foot in length which are usually trolled outside by outrigger poles. The halfbeak or balyhoo is a popular bait for the inside or flat lines and is particularly good for sailfish and white marlin. Small barracuda, mackerel, small bonito, bonefish, etc. have been used from time to time with some success. For bait, the natural food of marlins is not as important as the type of motion and appearance that the bait has trolling in the water; hence mullet is excellent bait though it almost never occurs in marlin stomachs as natural food.

Sex:

The author has examined gonads from 72 blue marlins from October, 1954, through October, 1957. There were 57 males and 15 females, a ratio of almost 4 to 1. The smallest male was 88 pounds and the largest 297 pounds, but only 3 males were over 200 pounds in weight. The smallest female was 105 pounds and the largest 430 pounds; only 4 females weighed less than 200 pounds. The average female was 137 pounds heavier than the average male.

One male blue marlin caught on May 26, 1956, off La Parguera weighed 229½ pounds and had testes of a total weight of 5 pounds, the largest marlin testes yet observed by the author. A female 286 pounds caught off Mayaguez on September 3, 1955, had ovaries weighing a total of 4½ pounds; the ovaries did not contain developed eggs. The testes of the male may have been ripening but did not have flowing milt.

Part of a large ovary from a 61 pound white marlin had well formed nearly ripe eggs; the fish was caught off San Juan on June 11, 1956. All other white marlin gonads seen by the author have been undeveloped.

All sailfish gonads, both ovaries and testes, seen by the author from Puerto Rico have been small and undeveloped. Not enough gonads of either white marlin or sailfish have been examined to give any significant sex ratio.

Moon phase:

According to many fishermen, marlins are not supposed to bite much around the full moon. This was not so, however, in the 1954 tournament at San Juan, when 14 boats caught 4 blue marlins on October 12, the day of full moon. One day after full moon on September 3, 1955, off Mayaguez, 10 boats caught 4 large blue marlins.

Sixty-seven days on which one or more billfishes have been caught have been checked in respect to the moon phase. The 4 tournaments in October at San Juan are included as well as minor tournaments at Mayaguez and La Parguera. The data of 140 billfishes are listed under the respective days of the moon phase on which they were caught. The moon phases are listed from new moon day #1 waxing to day #15 just before full moon, and full moon day #1 waning to day #15 just before the new moon. The first and third quarters usually fall on the 8th to 9th day:

1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	1	2	3	4	5	6	7	8	9	10	11	12
-	9	-	3	1	3	1	2	2	17	5	12	10	8	1	10	10	8	12	4	3	3	1	1	2	3	3

13 14 15

4 - 3

While the data are statistically inconclusive, billfishes were actually caught on full moon days on 4 separate occasions. Catches of billfishes immediately around the first and third quarters are few except for the 10th day of the waxing moon on which 20 boats fishing for two days accounted for 12 marlins.

While the billfishing may be affected by moon phase, from the catch data collected in Puerto Rico it would appear that season, weather, food conditions, and other factors are of greater importance.

Weather:

Blue marlin fishing success is quite closely correlated with prevailing seasonal weather conditions. The biggest catches are made during the hurricane season, namely August through October. Barring hurricanes, August through November are the calmest months of the year. December through July are characteristically windy. February is the windiest month with July a close second; February has the lowest average billfish catches. On the contrary, February is about the best month for fishing dolphins.

Unusually good fishing sometimes occurs immediately before or after a bad weather or abnormal weather occurrence. The good fishing in October, 1954, tournament at San Juan was benefited by

the heavy rains caused by Hurricane Hazel which caused considerable outflow from the rivers and temporarily at least improved food conditions. Good fishing was experienced at La Parguera on February 24, 1957, a day of fickle north winds and rain, unusual for that time of the year. One sport fishing launch made a catch of well over 300 pounds of fish including: 1 blue marlin, 2 wahoos, 2 dolphins, 9 blackfin tunas, 9 false albacores and 1 frigate mackerel.

Tides:

The average open sea tidal difference around Puerto Rico is about one foot. There was some evidence in the October, 1956, tournament off San Juan that marlins were more active at the change of tide, because the time of greatest activity was approximately an hour later each day. A lot more data, however, is needed before the tidal effect, if any, on marlin activity in Puerto Rican waters can be determined. Tidal currents are strongest off the western and eastern coasts of Puerto Rico.

Depths:

As mentioned by Mowbray; 1956, a fathometer is a considerable aid to sport fishing as the drop offs near the 20 or 100 fathom curves can be accurately determined. Fathometers have proven to increase the catch for sport fishermen off Bermuda, and the same would probably prove true in the waters around Puerto Rico.

Many of the billfishes sighted or caught during the 1957 tournament at San Juan, as well as tournaments of preceding years, have been observed from 2 to 3 miles offshore, which closely coincides with the 20 or 100 fathom curves off the coast north of San Juan (see chart #903 North Coast of Puerto Rico, Punta Penon to Punta Vacia Talega).

Though blue water is generally favored for the catching of marlins, they have been caught in greenish water fairly close to shore not only off San Juan but also off Punta Cadenas, north of Mayaguez.

Fishing hours:

The customary fishing hours of most sport fishermen who fish for billfishes in Puerto Rico is from 9 to 4 p.m. Hours before or after are spent in going to or coming from the fishing grounds. Marlin fishing could be improved if more fishing at dawn and dusk were practiced; even fishing at night might be attempted.

During the full and new moon periods, a major solunar period occurs around the middle of the day, when the moon is directly overhead or directly underfoot. The better catches of the 1954 San Juan tournament occurred during the time of the major solunar period. The lack of a major solunar period during the customary fishing hours may in part explain the lighter catches of blue marlins recorded during days of the first or third quarter of the moon.

SUMMARY

Billfishing in Puerto Rico is a recently developed sport. Since 1950, over 600 billfishes have been boated in Puerto Rican waters. Blue marlin are most numerous with sailfish second and white marlin third. There is a marked seasonal difference in abundance among the billfishes with differences between the three species.

Among blue marlins there is evidence that the males are more numerous and smaller in size than the females.

REFERENCES

Erdman, Donald S.
1956. Recent Fish Records from Puerto Rico. Bull. Mar. Sci. of Gulf and Caribbean, 6(4):315-40. Marine Laboratory, Univ. of Miami.

Mather, Frank J. III
1956. Game fishes of the Virgin Islands. International Game fish Conference at Nassau, Bahamas. Marine Laboratory, Univ. of Miami..

McCallan, Ralph S.
1949. First Partial Report of the Findings in research of Game fishing of Puerto Rico, period of Feb. 23 to June 30, 1949. Office of Tourism, San Juan, P. R. (mimeographed report)

Mowbray, Louis S.
1956. The Gamefishes of Bermuda. International Game fish Conference at Nassau, Bahamas.

TABLE 1a - BLUE MARLIN WEIGHTS; NORTH COAST OF PUERTO RICO

year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1950								404		119		
1951									130	154	362	
									152	141	128	
										94	112	
										169	404	
1952			357½			209	101	136	219¼	146		
						400	120	85	149½	151½	95	
							121½	125	169	130	109	
							121½		154½	372		
									321			
									144			
1953	130	132	156	440½		307¼		411½	162	120	115	
	194					146		315	141	128	346	
								170	130	119		
								100	118	113		
								100	153			
									140			
1954			120	385		136	144		243	181	140	403
			90			54			120	163		360
						142			247	156		
						56			290	150		
						142½			332	110		
									112½	116		
										124		
										108		
										115		
										120		
										122		
										105		
										96		
1955			94	113	180	144	135	197	120	178		
						306	129¼		150	350		
							105½			193¼		
							258			97		
										117		
1956				756	494	356		281	124½	128	130	92
				92	156	303			86½	122	136	190
					298	150			282	136		46
					55	118			173	120		
					52	140			146½	139		
					133	118			153½	105		
						245			120½	116		
						104			182½	106		
									214	322		
									379	187		
									110	139		
									290	141½		
									275	90		
									165	306		
									145	88		

TABLE 1a (continued)

year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1956									165	104		
(cont)									175	127		
									129	148½		
										91		
										163		
										239		
										126		
1957	152	198	248		255	110	430	162	160	354		
			131		108	180	407	280	196	127		
			265		119	125	109	118	428½	117		
						250	225	272½	140	233		
						150	430	202		156½		
						150	184	120		119		
						260	122	119		113½		
						70	130	165		160		
						120	90	132		114½		
						409		158		211		
								114		299		
								140		204		
										112		
										112		
										171		
										112		
										154		
										120		
										101		
										130?		
										120		
										130		
										112		
										132		
										119		
										125		

TABLE 1b - BLUE MARLIN WEIGHTS FROM THE SOUTH COAST OF PUERTO RICO

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1944						240						
1951		148	144							142		
			147									
			148									
1952												
1953			132							276		
1954	159		218		187						177	
1955	314		297	171½	142	200				137	142	
				101		351				118		
				147						101		
				218						105		
										122		
										150		
										120		

TABLE 1b (continued)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1956		98	132	134	229½							120
			96	125								134
			155	135½								132½
												187
												137
												144
1957	117	187½	138	180	175			222				
			56									
			58									

TABLE 1c - BLUE MARLIN WEIGHTS FROM THE WEST COAST OF PUERTO RICO

year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1951				200				150	247	335		
1952												
1953							393			174		
										150		
1954								175	130	347		
									137			
									150			
									166			
1955				300		150		195	286			
									132			
									167½			
									267			
									114			
									409			
									118½			
									195			
1956	190	152						300	281			
									221			
									138			
									312			
									574			
1957						225		200	173½			
									125			
									118½			

TABLE 2 - WEIGHTS OF WHITE MARLINS RECORDED FROM PUERTO RICO (Erdman)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1950										43		
1951									41	45	46	49
										59		
1952			48	76¼			51			40	63¼	
				33								
1953	49	57		55	60	55			55½			
	45½			72½	55	55						
	57											
1954		51		69½	51						43	
											42	
											33	
1955	22	76½		91	62½	47	35½			34½		
				62		81½						
				53		71						
1956	75		55	58	50	67						
	71		46	78	50	61					64	
	56		65	40	85							
				40								
				56								
				53								
				60								
				63								
				68								
				38								
				69								
1957	75½	66	58	56	70	43	60	60	---	44		
	69	62		56	50	50	50	49½		51		
				59	52	60		59		50		
				62	46½	56						
				76		50						
				55		55						
				75								

TABLE 3 - WEIGHTS OF SAILFISHES RECORDED FROM PUERTO (Erdman)

Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1950										41½	49	32
											43	
											45	
											45	
1951	44			35						46	40½	60
	40									55½	10	39
										49		43
												37
1952	38	52		43						57½	40	50
		25										
1953	44	63½	11	43	42½				53	68½	41	
	33	53	37	47						50½	42	
	59			48						40		
				45½						48		

TABLE 3 (continued)

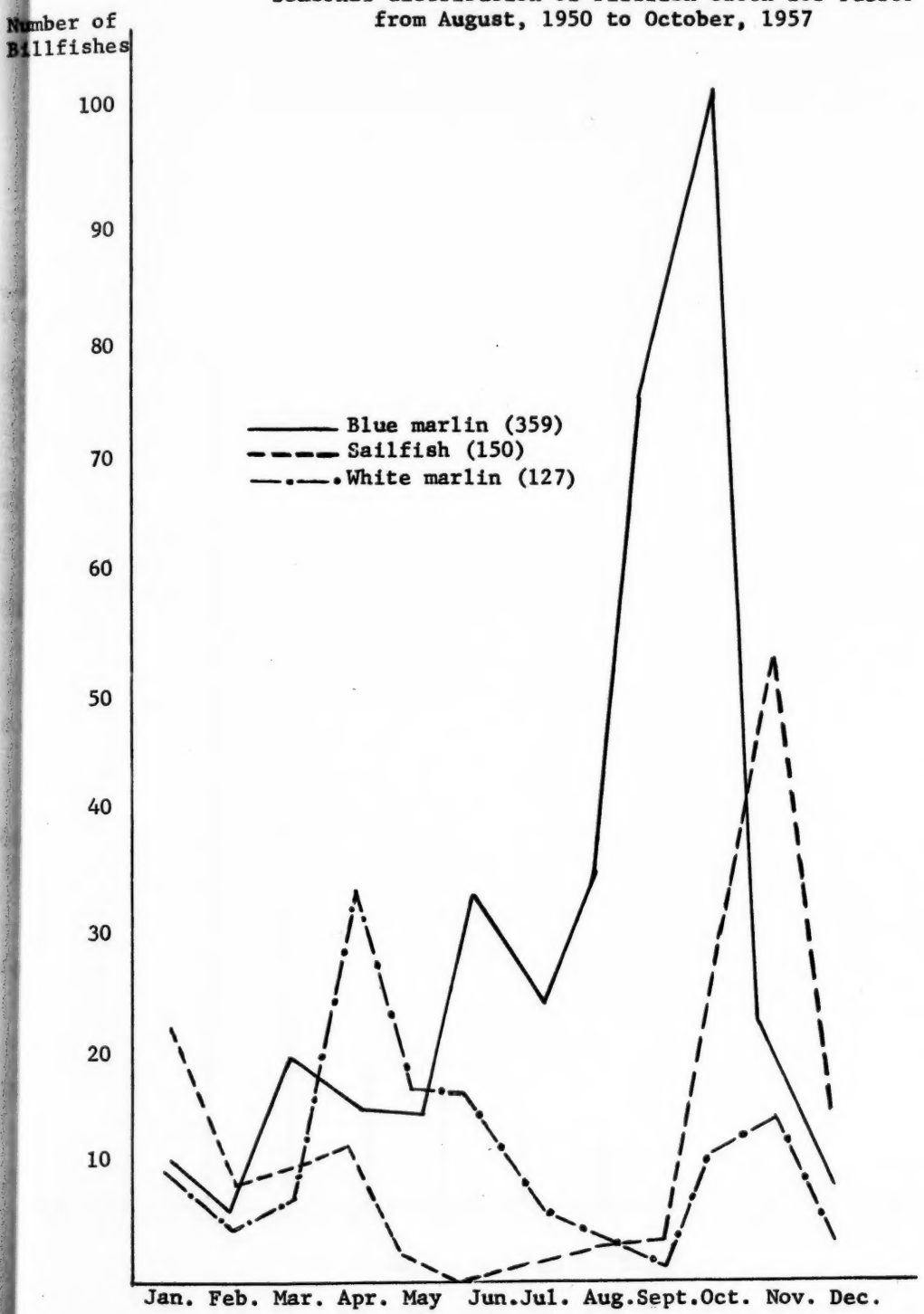
Year	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1954				42	44			54		43	37	46
				41						55	47	
											42	
1955	38								58½	43	40	41
	27									41½		
										37¼		
										44¼		
										44½		
1956	40		40	60			24¼	40		57	40	37
	27		24	56						27	45	32
			54	55							45	46
			51								35	39
			46									39
												39
												39
1957	39	40						44½		42		
	14	45								44		
		48								47		
										50		
										50		
										54		
										48		

TABLE 4 - BILL FISH STOMACH CONTENTS

Species found in billfish stomach	Species of billfishes*		
	Blue Marlin	White Marlin	Sailfish
Auxis thazard frigate mackerel	12		2
Thunnus atlanticus blackfin tuna	6	1	
Euthynnus alletteratus false albacore	2		1
Katsuwonus pelamis oceanic bonito	1		
scombrid (unidentified) tuna family	1		1
Manacanthus hispidus file fish	4	1	
Xanthichthys ringens triggerfish	4		1
Lagocephalus smooth puffer	3		
Canthidermis? triggerfish	1	1	
squids	6	3	3
octopus	1		
Decapterus round robin	3		1
Caranx crysos blue runner	1		
Oligoplites saurus leather jack	1		
Coryphaena equiselis little dolphin	2		
Xiphias gladius swordfish yg.	1		
Pseudoscopelus deep sea fish	2		
Acanthurus young doctorfish	2	1	
Tylosurus needlefish	3		2
Ablennes hians flat needlefish	---		2
gempylids snake mackerels	3	1	
Epinnula	1		
berycoids	1		
Brama raii	---	1	
Hemiramphus brasiliensis halfbeak	---		2
Cypselurus flyingfish			1

*Figures in table indicate the number of Billfish containing the species listed in the left hand column.

FIGURE 1.
Seasonal distribution of billfish catch for Puerto Rico
from August, 1950 to October, 1957



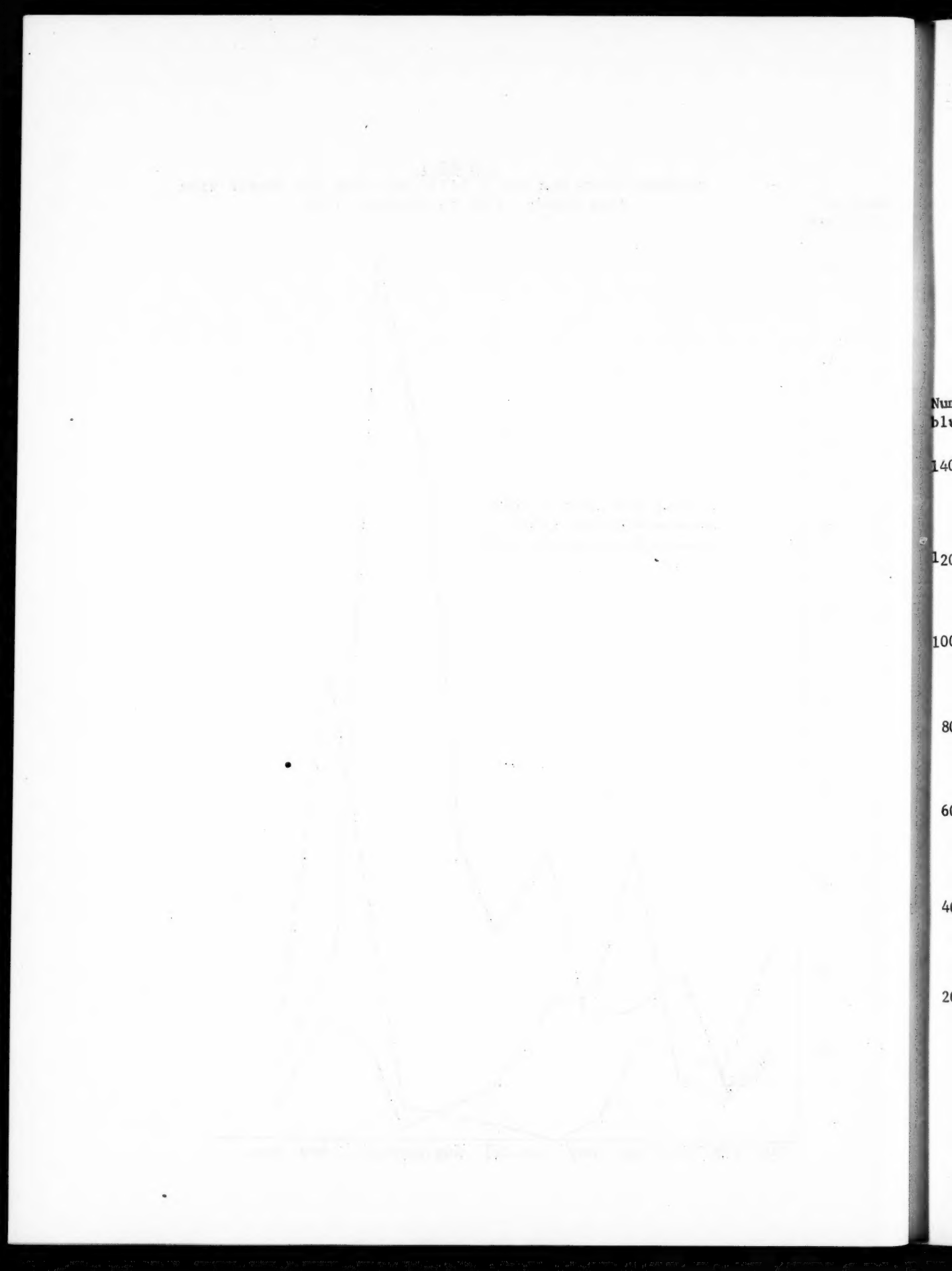
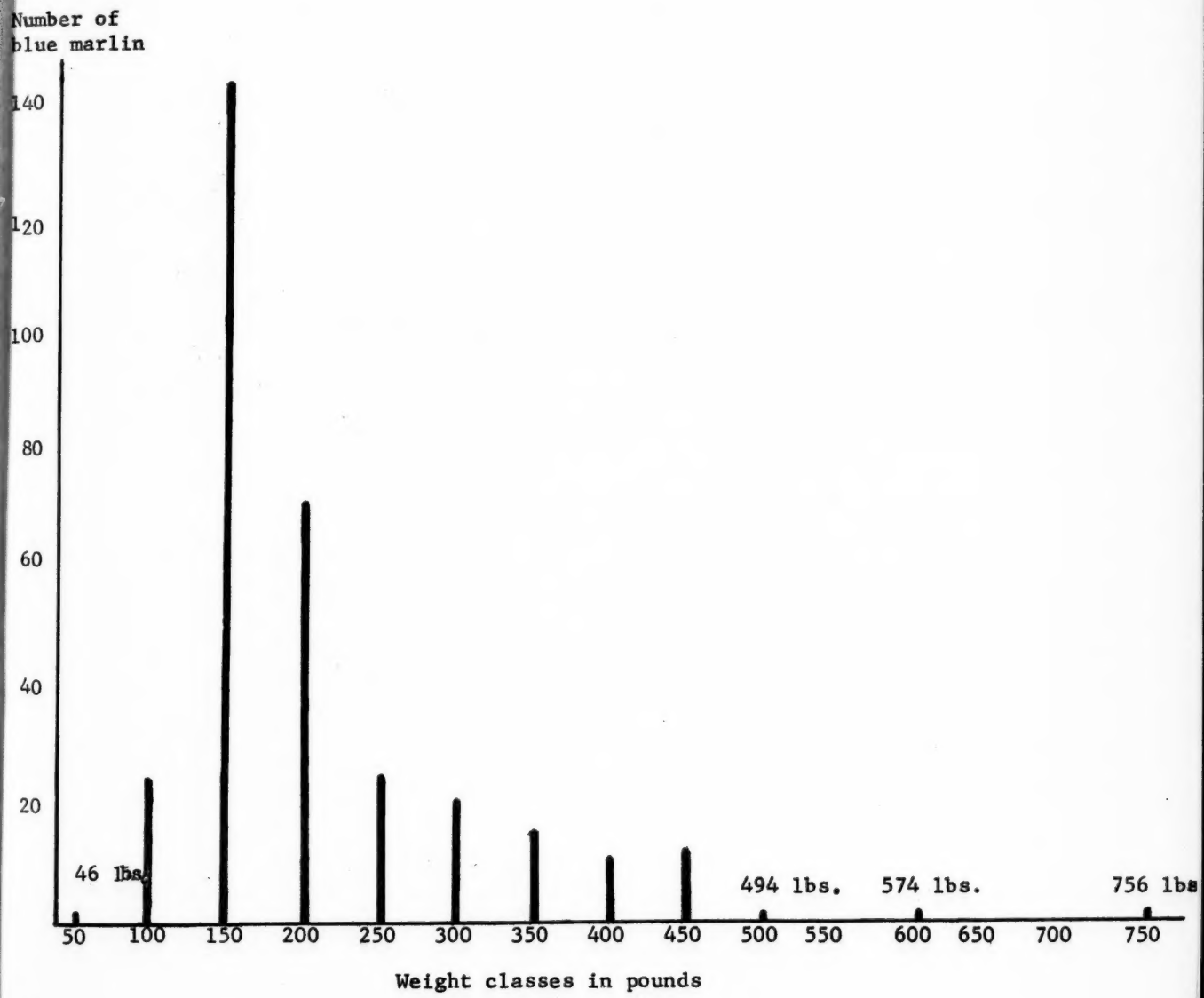

Num
blu
140
120
100
80
60
40
20

FIGURE 2.
Weight frequency distribution of 326 Puerto Rican blue marlin



BIRDS, WHALES, MARLIN

presented by

George Bass
(Read by John Rybovich)

at the Second

INTERNATIONAL GAME FISH CONFERENCE

Miami Beach, Florida

November 16, 1957

BIRDS, WHALES, MARLIN

by George Bass
(Read by John Rybovich)

It was with certain mixed emotions that we felt our plane touch down at Maiqueta Airport, Venezuela - Airport of Caracas - some five and a half hours after leaving Miami, Florida, signaling the commencement of our second exploratory trip covering the salt waters off the Venezuelan coast -- feelings of tremendous anticipation together with considerable wonderment of the marine life we would encounter.

While on the first stage of our exploratory work in Venezuela during March and April, we had made a thorough study of the Southern Equatorial Current waters off the northern coast of Venezuela, and the well-substantiated presence of bait fish such as sardines and small mackeral to be expected during the summer months, together with the consequent following of large schools of white marlin drawn to this area by these bait fish, and the results of this research could point to only one possible conclusion, yet we were inescapably drawn back to these waters to see for ourselves whether it might possibly be true that these fish could be present in such unbelievable numbers.

Our study further pointed to the gradual appearance of these white marlin through the spring months, reaching a peak period of concentration about the middle of July, with tremendous schools of these fish remaining until approximately October 15. Further, local records indicated 56 of these white marlin being brought to the Arrecife dock in one and a half days during the first local Venezuelan Tournament ever held, in 1956.

Certainly the presence of great quantities of Spanish sardines and mackeral was indicated during that period of the year and we had, therefore, decided that this area might well be considered one of the most highly regarded sportsfishing grounds in the Atlantic Ocean.

On the first leg of our exploratory trip off the Venezuelan coast during March and April, we had certainly established that the waters between Laguna and LaGuaira, the port of Caracas, were productive, beyond any possible expectation, of blue marlin averaging some 275-300 pounds. On that trip we had fished those waters for fourteen days during which time we raised 32 blue marlin to baits, boating nine.

Obtaining larger baits the last five days of our blue marlin activities and using 2-1/2-3lb. bonito in lieu of 1-1-1/2 lb. mullet, we were successful in landing four blues in the five-day period.

We had also seen several white marlin during that time, boating four, averaging slightly less than 75 pounds apiece.

Most certainly all of the other requisites were present -- records of prolific marine life, fishing within very close proximity of shore - from three to eight miles off, together with presence of bait in unbelievable numbers and with the relative calmness of waters so essential to the conducting of pleasant salt water sportsfishing activities.

Yet, while we had definitely determined that white marlin should be present during the period of July through October, we none the less were faced with the urgency of experiencing for ourselves this unheard of concentration. Our feelings, therefore, were somewhat divided -- the deepest pleasure at the prospect of returning, combined with curiosity of what we were to find.

After all, sportsfishing activities off Venezuela have only recently been engaged in and, even as such, to a very limited degree with only a mere handful of anglers and boats participating, consequently definite knowledge might well be colored with considerable conjecture and not a few theories. An overly enthusiastic description of local fishing waters is usually more of a rule than an exception.

In a way, our feelings might well have been compared to those of a major league baseball scout who had just arrived at a bush league ball park to get an eyeful of some newcomer reputed to blast out a homerun each and every time he came to the plate.

How little did we know that some twenty-four hours later the conclusions reached during March and April would not only be verified but that they would constitute an under-estimate of what actually was to transpire.

Promptly the next morning, Phyllis and I, together with Captain C. C. Anderson, were introduced to a new 42-foot twin-engine boat, the CONAHOTU II, which the Government had recently purchased for charter boat service and which they kindly placed at our disposal during our stay.

Shortly following the icing down of squid which we were using for bait, and meeting with the native crew, we were ready to cast off from our moorings at Playa Grande Yacht Club.

Offshore, proceeding in a generally northwesterly direction, we were soon three to four miles directly north of Arrecife, which had been recommended as probably the outstanding spot for locating these schools of white marlin.

Two trolling lines went overboard from the riggers, two lines then directly off the stern and with four baits skipping over the water, one man topside on the boat acting as lookout, we were not long in discovering evidence of fishlife.

A short distance away, the lookout sighted a large school of birds repeatedly wheeling in tight circles, then diving into the water - wheeling and diving - Could this be it - The fisherman's pot of gold at the end of the rainbow?

Fishing lines were speedily cranked in and the CONAHOTU II roared at top speed toward its objective!

Suddenly, and as we closed in, the picture became more and more distinct.

A great school of sardines and small fish tightly balled in a circle some 50 to 75 feet in diameter, relentlessly surrounded and harried by marlin and whale.

In frantic efforts to escape, the bait fish were driven to the very surface of the water with the inevitable large school of sea birds feeding on the remainder of this slaughter at sea.

We were so transfixed by this picture that we momentarily forgot the reasons that had brought us to these waters - but not for long. Lines were soon overboard with baits trolling now close up to boat only some thirty to forty feet behind with the CONAHOTU II making its first direct pass through that maelstrom of sea life - Bait fish frantically attempting to escape certain destruction, marlin darting and crashing through the huge circle of sardines the whale working his way more ponderously through the school, first submerged then surfacing to blow, literally scooping in hundreds of pounds of bait fish with every pass through the school, while overhead the birds wheeling, diving and picking up the remnants of this massacre.

The marlin swirling and darting toward our bait with their beautiful royal blue dorsal and pectoral fins completely extended, glowing as neon lights - occasionally throwing themselves clear of water, provided one of the most spectacular sights ever seen.

Soon all count was lost of the strikes we obtained - These were wild, crazy marlin - mad with the sheer lust of killing.

We were accustomed to the normal, deliberate and studied approach of a marlin behind bait in a relatively orthodox fashion, hitting it with his bill, together with the customary free spooling of reel and drop-back of bait following strike to simulate the billfish stunning or killing its prey - then the inevitable picking up of bait by the billfish in his mouth and turning away, throwing reel brake on and striking once, twice, three times in order to set hook - But now all rules were tossed overboard.

We desperately shortened our drop-back of bait following strike to only a bare few feet before throwing brake on and striking fish - other times merely giving the length of the rod tip -

holding rod high in a vertical position and immediately upon strike merely lowering the rod tip with brake on, then striking and attempting to set hook.

The first marlin we took proceeded to prove why he is the most highly prized light-tackle fish in the ocean. Weighing between 65 and 100 pounds, his behavior is quite comparable to his somewhat better known cousin, the sailfish, that is, with one lone exception - he will do everything a sailfish will do, and will then do it all over again - only better!

In his violent attempt to rid himself of the tormenting hook, he will throw himself into long, magnificent greyhounding, curving leaps, then changing his fighting style with breathtaking suddenness, followed by furious headshakes, then a spectacular series of tailwalking, skittering across the water fifty to one hundred yards, supported and driven by only his tail.

The fight above water may go on for minutes, then the inevitable sounding 50, 75, 100 and possibly 150 yards straight down - From that moment on it is entirely up to the angler to exert sufficient pressure on the fish to raise him to the surface without, of course, engendering the possibility of breaking him off, with the entire fight going on for 45 minutes or even an hour.

The angler standing in the cockpit, supporting rod through means of a rod belt and gimbel socket attached thereto, and using 3-pound test line, which is normal tackle for these fish, may move about from one side of the cockpit to the other, dependent upon which direction the fish elects to take, giving first to the angler maximum mobility and allowing the fish its own maximum efforts while not encumbered by extremely heavy line to fight and to drag through the water.

Fishing and fighting these white marlin such a short distance off shore, against the magnificent backdrop of cloud-shrouded mountains rising up nine to ten thousand feet, is truly an unforgettable experience.

As rapidly as one school of bait fish was decimated, we located another - always following birds - Some fifteen times that day the never-changing law of the sea was unfolded with its most dramatic overtones - Birds - WHALES - MARLIN - all preying on the weaker!

Returning to Playa Grande Club dock that first evening - practically in a state of shock - we had finally succeeded in taking nine of these whites - a very frustrating average by comparison to the number of strikes obtained - at least calculation some 35 - yet fabulous number of these fish to be taken in one day.

Always a cunning and wily adversary, the white marlin was at his best!

Slashing, rampaging, unpredicatable fighter that he always is, the white certainly has the ability of transforming, in these waters, the calmest, coolest angler into nothing short of a gibbering idiot.

The following eleven days prior to the three-day Venezuelan Tournament were a duplication of the first -- Vast schools of bait fish, birds, and the inevitable whales and marlin, with a daily average of eight to ten white marlin brought to boat continuing each day.

Occasionally sailfish would be found among the marlin, these sails averaging some 65-70 pounds or somewhat larger than those taken off the eastern coast of the United States.

Large dolphin were not uncommon and we found it quite a rarity to take one of these fish weighing less than 18-20 pounds, with the average closer to 25 pounds.

Schools of porpoise likewise took part in the general festivities, providing a never-ending source of pleasure as we watched them racing along with the boat.

While we were concentrating our efforts at the white marlin grounds, other anglers using heavy tackle and working 15 to 20 miles to the east of our location, off the westerly end of the shoal bank, directly north of LaGuaira, boated five blue marlin, averaging some 265 pounds.

They were working the same identical location that we had previously fished during March and April for blues, thus proving beyond doubt that these fish are indeed present in those same waters from March through September.

The National Venezuelan Tournament started on September 13 continuing through September 15 with teams from Puerto Rico, Cuba, Colombia and the United States participating, together with local National Venezuelan Teams for a period of three days and an astounding number of fish boated totaling 204 white marlin, 31 sailfish, and although tournament anglers were concentrating their efforts on the schooled white marlin together with sailfish, one blue marlin was taken and a great number of dolphin, the billfish aggregating 236 or the greatest number of white marlin and billfish ever taken in a three-day tournament in the Atlantic Ocean.

Certainly, there is present off the coast of Venezuela the greatest concentration of marine life we have ever witnessed and while on our initial trip during March and April we were tremendously impressed by the abundance of salt-water marine life we had encountered, impelling our prophecy that these grounds could provide the greatest white and blue marlin fishing in the world, we were hardly prepared for the results obtained during our return trip in September as they were so far beyond any possible expectation that it literally beggared description.

The ocean was alive with every known form of sea life common to the Atlantic Ocean - flying fish, bait fish, porpoise, dolphin, whale, marlin, together with the general host of all other oceanic fishes.

We know now from our own experience that white marlin weighing an average of 75 pounds apiece are present in March and April, continuing on in tremendous schools during July through mid-October.

The phenomenal number of blue marlin to be found in this general area is startling. These fish averaging upwards of 265 pounds each, can be found in these waters practically the entire year and in such numbers as will allow an angler to average three or four strikes per day.

Local Venezuelan records which have been maintained for several years indicate conclusively that blue marlin have been taken from February through October and even though the Trade Winds are very strong in November and December, there are records of large catches of these fish during those two months.

When it is considered that this large white and blue marlin concentration continues uninterruptedly each year for a period of many months, we can only conclude that the waters off the Venezuelan coast offer the greatest sportsfishing possibilities of any heretofore explored in the Atlantic Ocean.

Our exploratory trip successfully concluded, we reluctantly took leave of these fabulous waters and returned to the United States.

Now, dwelling in retrospective contemplation on all of our fishing experiences off the Venezuelan coast, we are reminded somewhat of those feelings enjoyed by Uncle Josh who upon his first visit to the zoo and careful study of the giraffe was heard to mutter - "Durn it, there ain't no sich animal."

SURVEYING FLORIDA'S SALTWATER SPORT FISHERY

presented by

Robert W. Ellis

THE MARINE LABORATORY
University of Miami

at the Second

INTERNATIONAL GAME FISH CONEERENCE

Miami Beach, Florida

November 16, 1957

SURVEYING FLORIDA'S SALTWATER SPORT FISHERY

by Robert W. Ellis

The Marine Laboratory, University of Miami

The studies which I would like to talk about today are those which are being done at the request of Mr. Ernest Mitts, Director of the State Board of Conservation and which might be compared with the industrial procedure of taking an inventory.

We have been taking an inventory of the coastal game fishery in two steps. The first step took place in 1956 and in the first half of this year. In this study we measured the amount of money spent by anglers as an indirect measure of the value of the fishery to the state. The other factor we measured was the amount of time spent fishing. This we usually call fishing effort or fishing pressure. The information from about 6,000 interviews and many thousands of counts was transferred to cards and sorted and totalled by machines.

The second step in the inventory started a few months ago. The purpose of this step is to work out procedures which can be used this year and in future years to find out just how much fish is being taken out of our coastal waters.

It was not practical in any of these studies to contact all anglers so results were based on interviews with sample anglers. Sampling methods are frequently used in science and business. One well-known use of sampling methods is in measuring the shows watched on television. By interviewing or telephoning a small group of people, according to previously proved selection methods, the habits of the entire population can be measured fairly accurately.

In the expenditure study, we felt justified in adding not only those directly associated with fishing, such as bait and tackle costs and boat rental fees, but also indirect costs such as food, accommodation, and travel during fishing trips. We felt that the money spent on these indirect items would not have been spent but for the attraction of fishing. Two basic kinds of expenditures were recognized. One, called repetitive costs, included expenses usually incurred on fishing trips and food, bait, and expendable tackle. The other, called non-repetitive costs, include expenses infrequently incurred on fishing trips and tackle, boats and motors. The average cost per angler per trip for repetitive items was determined by interviewing groups of anglers around the state while they were fishing or as they disembarked from a fishing trip.

Total angler expenditures on repetitive items was calculated by multiplying the average cost per angler trip by the total number of angler trips. The methods used to estimate the number of

angler trips will be described later. Fairly complete and reliable figures for tackle boat and motor expenditures were obtained largely from trade sources on sales volume of these items in Florida.

For sampling purposes, the following eight different types of fishing activity were treated separately. These were charter boat, party boat, boat rental, paid pier, bridge and jetty, shore, private boat and spear fishing. Information was obtained on all but the last of these.

Within each of these types, expenditures and fishing effort of residents and visitors were handled separately.

Fishing effort estimates for charter and party boat, boat rental and paid pier fishing were obtained by interviewing operators of these facilities and asking how many anglers fished with them during the year. The total effort was calculated by multiplying the average number of angler trips per operator by the total number of operators.

Bridge, jetty and shore fishing effort was estimated by making frequent counts of fishermen at these locations and multiplying the number on an average day by the total number of days and locations. We had planned to estimate private fishing effort in the same way as for bridges except that boats were to be counted from an airplane. However, when the planes were withdrawn for fruit fly spraying, soon after the survey started, another method had to be worked out. This was done by finding out how many persons owned boats and the average number of days fished. This information was obtained from a sample of about 1,500 persons contacted by telephone in cities all over the state. The average number of angler trips was multiplied by the total number of persons who used boats in salt water, to give an estimate of the total private boat fishing pressure.

Almost all interviews, fishermen counts and telephone calls were made by agents of the State Board of Conservation.

Nearly 20 million fisherman trips, more than half of which took place on private boats, were made during the survey year. On all the many items incurred during fishing trips in the coastal waters, anglers spent almost 260 million dollars. The detailed report on the methods and results of this study should be available in about two months.

There is a strong temptation to compare the total angler expenditures with the 30 million dollars paid to commercial fishermen for their production. I should like to digress for a moment to explain why this comparison should be avoided. The sum total of angler expenditures as estimated in the survey involve many levels of distributions, including the approximate equivalents of the wholesale and retail levels. If all of these expenditures could be adjusted

to the wholesale level, the value would be considerably less than the 260 million dollars quoted above. On the other hand, the 30 million dollars reported for the commercial fishery includes values only at the primary level of distribution. The real value of the commercial fishery to the state, embracing the processing and selling of the fish, as well as the catching, is probably closer to 90 million dollars. As yet, no adjustment factors are available to enable the values of the commercial and game fisheries to be compared directly, and any comparison before such factors are available would be most unwise.

Although we do not yet know the actual value of the game fishery to the state, the study did show that it is great and that the game fish stocks are among the state's greatest assets. Nor should the intangible importance of the game fishery as a source of healthful recreation be overlooked.

I should like to turn now to the other inventory-type study which we started a few months ago. A 1955 study by the Department of Agriculture showed that one third of the households which consume fish obtained their supply at no cost. It is probable that these fish were caught by anglers themselves. (Source: Food Consumption of Households in the U. S. Department of Agriculture, 1955.)

The catches of tomorrow will depend upon how well they are managed today. The first step in the management program is to calculate how many fish are available at present. We cannot count the fish, so we must use an indirect method to estimate the abundance. This indirect method consists of finding out the total catch and the catch rate; in other words, the number or weight of fish taken on an average trip by different fishing methods. A decline in both the total catch and the average catch per trip for any particular species of fish suggests that that species is less plentiful and protective measures may be required. A decline only in the total catch in any year might only mean that fewer people are fishing that year.

During the last few months we have been devising and testing methods of measuring the catch and the catch rate of each species of fish by anglers and since some game fishes are important commercially this information is also being collected from the commercial and bait fishing industries. Sampling methods are again being used. The approach this time is to make estimates of the number of fishermen of each kind, including commercial fishermen and resident and visiting anglers, and to find out the average catch rate from a representative group of each. Commercial and bait fishermen are being contacted through the fish dealers who purchase the fish. A sampling procedure very similar to one used by one of the television audience rating services has been set up to study angling among residents of the state. Coastal and inland cities of all sizes were selected at random and within each city names were chosen from telephone directories. A total of about 2,500 calls are being made by the conservation agents. Previous experiments have shown that this number is usually sufficient to give a fairly accurate estimate of the habits

of the entire population. The number of calls made in any city is proportional to the population of the city. For example, almost one fifth of the state's population live in the Greater Miami area so about one fifth of the calls will be made there. Since about one third of Florida residents do not have telephones, we are picking up the names of a sample of these people from city directories, in case they fish more or less frequently than telephone owners.

One member of each household contacted is asked if anyone plans to fish in salt water in the next year. The percentage of salt water anglers in the sample is used to estimate the total number of resident anglers throughout the state. A small telephone survey was made several months ago. About a third of persons contacted reported that they fished in salt water during the previous year. We believe that this survey indicates that about a third of the total population fished last year. Therefore we have well over a million resident anglers in the state. Anglers contacted by the agents during the survey are being asked to send us monthly reports of the number of trips made and their catches. These reports have started to come in and we are very grateful for the cooperation of these anglers. Ultimately we expect that more than one thousand anglers will be sending us reports each month from all parts of the state. Totals of numbers of trips and catches of fish will be obtained by machine tabulation.

The percentage of anglers in the sample will give us an estimate of the total number of anglers in the state. If we multiply the average number of trips and catch per angler by the total number of anglers we then have an estimate of the total angling catch and the total number of trips made in Florida by resident anglers. Different species and different areas within the state will be treated separately.

The remaining group of anglers not yet considered is the visiting angler group. For example, during last year's survey we found that more than 10% of the total fishing activity was done by visitors. We have not yet finally decided on the best method of measuring the fishing habits of these people. Two methods which we are considering at present are contacting tourists either at hotels and motels or perhaps as they enter or leave.

DISCUSSION

Moderator: JOHN S. GOTTSCHALK

Discussion Panel: Robert H. Gibbs, John E. Randall, John Rybovich, Francesca R. LaMonte, Edw. W. Gorham, Robert E. Maytag, Edward S. Corlett III, Charles F. Johnson.

SPEARFISHES IN THE WESTERN ATLANTIC
Discussion Leader: John E. Randall

Gibbs:
What sort of distribution do the spearfishes have?

Randall:
The long billed spearfish is not the rare fish we first thought it to be in Florida waters. Bob Maytag took one in Puerto Rico and we measured another just like it. Tetrapturus Belona is known off Sicily, in the Mediterranean. It is rare in this area, but we are seeking a specimen of a species even more rare.

Gorham:
I wonder if anybody would know from an angling point of view how these fish would lie. Do they act like sailfish, on the surface, or sound and stay under the water.

Maytag:
The fish which we got behaved very much like a white marlin. It was caught on 15 thread, but took the bait like the other billfishes, made a few jumps, sounded, came back up, and was still jumping. It took us fifteen minutes to get the fish to boat.

Gorham:
Down here both the Rod & Reel Club and the Metropolitan Miami Fishing Tournament have encouraged the releasing of sailfish. This is also done in the Palm Beach and Fort Lauderdale area. Are we missing important new fish by releasing them?

Randall:
The sailfish has an enormously large fin, which can hardly be mistaken for anything else.

Gorham:
Probably we should use publicity to encourage anglers to bring in any fish which did not look like a sailfish. A tremendous amount of publicity is available. Fishing participants number 400,000 or 500,000 each year. We could ask them to be on the lookout.

Sutkuss:
What is the minimum critical depth in which the young fish are found towards the shore?

Voss:
We do not know anything about the young marlin or tetrapturus, only the sailfish. Young sailfish are found across the entire Atlantic and Pacific.

LaMonte:
Did I understand you to say that this spearfish was the same as the Messina specimen, which has an extraordinarily short spear?

Randall:
It was indicated that Mr. Maytag's specimen was an intermediate form.

LaMonte:
Perhaps one or two of these fishes was a young marlin. We know little of its life history.

Johnson:
Five or six or seven years ago we organized the sailfish release program in Palm Beach and Fort Lauderdale. Some things coming out of it might be very enlightening. Since World War II the size of the fish has become progressively smaller and smaller. Could there be some connection between the release program and the rapid growth in number of young sailfish I wonder.

Randall:
We have had a second tag recovery of a sailfish. The specimen is at Mr. Pflueger's establishment and I do not think it has been examined. With respect to dart tags, the overall results from the tagging have been disappointing. I have just received darts used on the skipjack. The dart part is plastic and pliable, which I think might be better than the metal one. On the skipjack there was almost a 10 per cent recovery. I wonder if we might have a reappraisal of our tagging program and make it similar to the Fish & Wildlife program in the Pacific.

Johnson:
With the present method I doubt seriously if anybody notices whether there is a tag on the fish. The method of releasing the fish does not involve bringing the fish up to the boat so that you do not know whether it has a tag or not.

Rybovich:
If we were to try to fish for spearfish, do the known catches give us a hint as to a way which would make it more easy for us to catch one of them?

Maytag:
We were towing mullet and ballyhoo. The fish took the ballyhoo.

McCarthy:
Is there any particular part of the fish into which you should insert the dart tag?

Randall:
I think Mr. Johnson's were at the head end. The dart tag should go into the fleshy part. The Fish & Wildlife Service and the Inter American Tuna Commission have had a much higher return with a yellow tag, and I think we should think in terms of this color.

Gottschalk:
California found aquaria extremely valuable in testing out the various kinds of tags. They had a fish for over a year with tags of various kinds inserted. This was useful in developing the spaghetti tags.

GAME FISHING IN PANAMA
Edward S. Corlett III.

Gorham:
I have been down to Panama about fourteen times myself. It is fabulous fishing.
I believe you mentioned blue fish down there. Did you notice anything leading to the belief that this could be a separate population from the Atlantic coast?

Corlett:
I do not remember mentioning blue fish.

Johnson:
I would like to add to what Mr. Corlett has said. The Panama sailfish make ours look like pygmies. We give gold buttons for an 8-footer here. Those Panama ones are wonderful fish. Before I went down we were told they were sluggish and did not fight but the Pacific sailfish is just as good a fighting fish. Anybody wishing a good fishing trip should go to Panama.

Rybovich:
I am in support of Panama.

Erdman:
How about boat facilities at Panama? How much do they charge a day and what kind of services are they giving? How many boats are available.

Corlett:
In the past the hotel only had two boats and I would say the average

charter, including food, is about $100 a day. If you cannot go for eight or nine days I do not think it is worthwhile. In the tournaments there are quite a few boats about, probably ten or fifteen.

Smith:
One point arouses my interest. Why is this concentration of fish? I suspect Pinas Bay may have hydrographic features which bring nutrient salts to the area. I would like to hear of Dr. Galtsoff's experience in this regard.

Galtsoff:
I spent quite a time in Panama and the Panamanian Government provided me with a ship. Deep water comes from the south of the opening of the gulf, which provides very rich nutrients and plankton. The distribution of plankton is not uniform. The general situation in the Gulf of Panama is that the nutrients are distributed by the currents. I think the fish distribution follows that of the plankton.

John Manning:
Did the author report a few silver marlin?

Corlett:
We reported fish which the Panamanians call silver marlin.

John Manning:
Zane Grey reported "pale blue silver marlin." Since then the term "silver marlin" has had many dubious applications. I should like Miss LaMonte to clarify this.

LaMonte:
I feel very guilty about the silver marlin, because we named it a sub-species of the black marlin. We were only working on external features, but I feel that it had better be kept until it is proven. Regarding the Pacific blue, I would prefer not to go into that discussion now.

Erdman:
In Panama Bay I noticed that the temperature of the water was quite cold, which might suggest an upwelling. I almost froze in that water.

LaMonte:
I have a purely angling question. Is the stationary barge still there? How do you weigh in your fishes?

Corlett:
We have to weigh them in on land. The barge is now at the San Blas Islands, where tourists spend the night, so we cannot use it.

LaMonte:
Have you seen the new portable scales? They are just coming on the market I believe.

Gorham:
We cannot always land in that area. In March I could fish at night so we had to go to Pinas Bay to weigh the fish ashore. This presents a problem. If something more convenient could be arranged I know the anglers would appreciate it.

Galtsoff:
In January and February we trolled all the time and the most abundant fish was dolphin. We caught one or two every other day. Is it common only during these months?

PRELIMINARY ANALYSIS OF THE DISTRIBUTION OF THE WHITE MARLIN, MAKAIRA ALBIDA (POEY) IN THE GULF OF MEXICO. Robert H. Gibbs.

Gorham:
Could you give some idea of how we can get fish in the area. How would one go about getting a boat over there? Or getting there?

Gibbs:
I have seen an article in the FISHERMAN magazine about some people who have been out there. I believe one leaves from New Orleans.

Rybovich:
In the article he refers to an ex Miami charter boat operated by Jack Brown, who had phenomenal success with both whites and sailfish.

Sutkuss:
They do go out to the oil rigs. Some go to the mouth of the river. It is quite a trip and the hurricane almost wiped out the island but they are still operating. It is about 70 miles to the mouth of the river. The only facilities belong to the sulphur company and the oil company and there is not very much in the way of facilities for docking.

Gottschalk:
I suggest you write to the Louisiana Wildlife and Fisheries.

Rybovich:
Dr. Gibbs talked about the concentration in July and August in the Delta country. This clears up a question we asked in Havana, and that is the fish we catch in March, April and May are all headed to the west. It looks as though we are dealing with three different populations. I would be very happy to find out what happens to those fish afterwards.

Gibbs:
I would question the fact that these fish are working from Cuba into the Gulf of Mexico in view of the single marlin which was recovered. It was tagged in Ocean City and retagged in Cuba.

THE JOHN K. HOWARD BILLFISH PROGRAM.
Raymond C. Manning

Gibbs:
I would like to be sure what the general long range objectives are. Is it to establish the distribution?

R. Manning:
I believe distribution is the main idea behind the program, but I also think that Col. Howard is trying to tie in systematics with distribution.

Gibbs:
I believe that what little Woods Hole has done and what this program is doing are the only two agencies essentially gathering all this information. There should be some single person in the areas where the information is most like to come from and let the outlying areas be covered by a single man. One prime mover in a given area can do a great deal more than an organization from a distance.

Gorham:
Is it the purpose of the program also to be concerned with the billfish in the Pacific area?

R. Manning:
We are concerned with them all over the world.

Gorham:
It could be a source of good information for you to contact Frank Violette, who can give you the movements of fish for a number of years. He has kept surface temperatures, the kind of bait and whether they are marlin or otherwise. For three years between the 1st of March and the middle of April we were able to locate vast quantities of sailfish. Untold numbers would rise behind the boat. At one time we had eight lines behind the boat. We all had fish on. On another trip a man had a plug casting outfit and caught himself an 80 lb. sailfish and for 1½ hours there was a semi-circle of 12 sailfish about 14ft. to 20 ft. off the boat, after which they separated and came alongside the boat. That was for a period of three years. The last two years we could not find a sign of them, and we found out that the water was cooler this year. We found out that the sailfish were 100 to 120 miles offshore, 40 miles south of the Columbian border.

Roman:
One of the things which is almost unique about fishing for marlin off the coast of Africa, they tell me, is that they catch the majority on an artificial lure, a wooden plug.

R. Manning:
I believe that is so. The Colonel wrote and suggested trying other bait.

Gray:
I would like to make a few comments to those interested in sailfish and marlin. There is a great difference in the habits of sailfish between the Gulf Stream, along the coast of Florida, the Bay of Panama and in the western and central Pacific. Off Miami, Palm Beach and Stuart, the sailfish in their concentrations seem to be always moving, always south. With the winter months they start moving south. When they get off in the cooler area I think they mill around in a larger area and greater concentration. In the Bay of Panama, there is not sufficient current but all the way from Garrison Bay to Aquiba I have seen marlin and sailfish going in all directions. From there to the Galapagos Islands you will find sailfish everywhere unless you get south of the Galapagos, where it is a little too cold. In south Florida the sailfish mostly are in migration. They are not staying in one place. It is my belief that when migrating they scatter all round the Gulf of Mexico. It is much the same with the white marlin and the blue. Of a great many sailfish from 4" to 6" long, half of them were between Panama and the Galapagos Islands. I have found them at night with an underwater light, 500 miles from shore, either way. This is where they must be born, because they could not swim to shore in either way.

MARLIN FISHING IN PUERTO RICAN WATERS
Donald S. Erdman

Gibbs:
Would you comment on the possible swarming activities which might be going on.

Erdman:
there is little data but I have some marlin gonads. This jar is a white marlin section. The eggs are quite loose, so I think this particular jar has well developed eggs in it. I took it on June 11, 1956. I have here a large one from a blue marlin, but it is not ripe, collected in October, 1957, from a marlin which was 211 lbs. I have one testis from a marlin. The testes of marlins differ from other fishes. They are in sections which seem to be beaded. I have examined only the white marlin.

Gibbs:
I think it is possible that the concentrations off Ocean City follow spawning, or perhaps spawning will take place some time hence. The Puerto Rico runs could be spawning runs, also those off this area in the early part of the year.

Gorham:
You spoke of stomach contents of white marlin and some had inverted stomachs.

Erdman:
Mostly blue marlin.

Gorham:
Are you familiar with the fact that they can themselves reswallow their stomachs?

LaMonte:
I am wondering by what mechanism they can draw their stomach back in. It is very difficult and practically destroys the stomach and I cannot think what physical mechanism they can use.

Gorham:
Al Pflueger believes it is a way of getting rid of spiny objects.

Johnson:
Look at a billfish stomach the next time - look at the scars. I think it is a way of getting rid of something that hurts him.

Schmitt:
We can regurgitate food and why can't they? Such a thing would be possible.

Cass:
I have seen four or five different cases of sailfish which have been brought out and the hook taken out and they do not move 6ft. before their stomachs are right back.

Randall:
Don Erdman, Bob Maytag and I have discussed longlining in Puerto Rico. In view of our great need for stomach content data, Don is on the spot, and Bob has demonstrated that boats can put out longlines and we might be able to continue this through the year. Would it be possible to divert some of the Dingell-Johnson money into such a program?

Gottschalk:
If there are any regulations for using the Dingell-Johnson money for this, the answer is "No." The only trouble is that by law the maximum amount for Puerto Rico is $10,000 a year, and $10,000 for wildlife work. You are not going very far with $10,000 if you have to get a boat and a worker. What they need now is hard-hearted support and not kind words.

Gorham:
I would be interested in one question, and that is the various types of fish caught on the longline, and their condition.

Maytag:
The blue marlin we saw jump after taking the bait, so we decided to take him off the line. He jumped and stuck about 6" of his bill through the boat. So we didn't try to take any others off the line. The others were dead. A white marlin was pretty sick. Of the sailfish, one was dead and the other very much alive. The wahoo was dead, one tuna was dead, the other was alive, particularly the big one. A couple of dolphin were dead and a couple still alive. We saw a dolphin take the bait as we were putting the bait out. As we brought the line up after 2½ hours, the dolphin would grab the bait and at that time also we had a few sharks under the boat. The dolphin would take the bait and the sharks would chase them around and take the bait. The barracudas were dead. The sharks were very much alive, and the handsaw fish was very much alive.

Fairman:
A man went to look at the gear at Pascagoula, trying to get a cheaper rig and which would not necessitate the number of personnel they use to operate it. After several months he concluded that he had a rig which was a fraction of the cost of that used on the OREGON and also that used fewer personnel. He believed it was possible for small boat operators to use this as an intermediate type of fishing from the shrimp fishing in the other season. The boat was a 60ft. vessel.

Maytag:
What we used was very crude. We did not have baskets. The line was piled up on the deck and we tried not to step on it. The lines were snapped on under the swivels. One boy would bait the hooks and throw it overboard. If they wish to do this for a period of time, it would be worthwhile to have small winches to make them easier and faster for the boat to operate.

Johnson:
What was the average length of time after the last hook was baited?

Maytag:
About two hours.

Johnson:
Was it all daytime fishing?

Maytag:
Yes.

Gray:
I would like to ask Mr. Gibbs a question. During this longline fishing activity in the DELAWARE for instance, out of Nantucket. At practically every set they would catch white marlin and sometimes blue. 18,000 lbs. of tuna, more than 1,000 lbs. of marlin, mostly white, andblue 300/350 lbs. Is the scientific department of the government penalizing the spawning time of these marlin? It is generally believed here the marlin come through in the early spring.

Gibbs:
The people who are running this program are interested in very little except the catch record. On the marlins, as far as their spawning condition, whites seem just as those at Ocean City, not in spawning condition, possibly just before it. Blues are not in spawning condition.

Gray:
The idea is that they are so far removed from the ones we get here during the spring months.

Schmitt:
I think this is one of the most interesting sessions I have attended in many years. It seems to me that there are too many different programs. There should be a clearing house and all brought together. I believe the International Oceanographic Foundation has a committee which could get the thing coordinated. I think the tag program is one

of the most important. We must have a more conspicuous tag. We must have a freezer for the big specimens. You should have an ichthyologist to pick out the specimens to be saved. We must get the government and fishing agencies together and at the same time and same hour report to one place.

EXPLORING FOR GAME FISH
ALONG THE VENEZUELAN COAST. John Rybovich

Gibbs: This area where the concentrations of white marlin are so tremendous appears to be inside a chain of islands. How does that compare where there is no such thing, with no block to the open sea?

Rybovich:
There is a chain of islands but they are not landlocked. The water is in the hundreds of fathoms. There is ample space for free movement. We did not go outside the chain. There is a charter boat at Cuarcao which goes after blue marlin and quite a lot of whites.

Fairman:
I asked about the blue fish. Perhaps you were not there at the time when these were caught.

Rybovich:
They did not make an impression on either of the crew. I would judge them to be in the 3 to 5 lb. class, but there were plenty. The water was very cold.

LaMonte:
Did anybody examine the gonads? What was the sex ratio, and at what stage of development?

Rybovich:
They were not in spawning condition. With the Venezuelans the dorsal comes up to a flat top. On an average they are heavier than the white marlin.

SURVEYING FLORIDA'S SALTWATER SPORT FISHERY
Robert W. Ellis

No questions.

CLOSING REMARKS.

Voss:
I would like to comment, as in the past year, that we find very few of the charter boat captains - who are 70% of the fishing - attend the meetings and I would strongly urge those who are interested in the meeting to contact us and participate. I hope that next time they will feel free to take the floor and give us some of the wealth of information they have. I think we have had, through Dick Robins' planning, a splendid program. The discussions have been very active. I believe it is intended to hold the meetings annually and I hope they are planning

for next year. Don McCarthy has promised to give us a paper on the distribution of game fishes in the Bahamas. We are also going to be running some trips to the Tongue of the Ocean area later this year and we hope to have reports on our longline work in this region. There is increasing activity in the sports fishing investigations. Everyone is becoming aware of the importance of knowing more about them, and it looks as though things will continue to improve.